AMENDMENT 5b TO THE 2006 CONSOLIDATED ATLANTIC HIGHLY MIGRATORY SPECIES FISHERY MANAGEMENT PLAN

Including:
A Draft Environmental Impact Statement,
A Draft Regulatory Impact Review,
An Initial Regulatory Flexibility Analysis,
A Draft Social Impact Analysis

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Highly Migratory Species Management Division
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National Marine Fisheries Service
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Amendment 5b to the 2006 Consolidated Atlantic Highly Migratory Species Fishery Management Plan

Actions: Implement management measures consistent with the 2016 stock assessment update to end overfishing and rebuild Atlantic dusky sharks.

Type of Statement: Draft Environmental Impact Statement; Initial Regulatory Impact Review; Initial Regulatory Flexibility Analysis; Initial Social Impact Statement

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Abstract: The National Marine Fisheries Service (NMFS or "we") is amending the 2006 Consolidated Atlantic Highly Migratory Species (HMS) Fishery Management Plan (FMP) based on the 2016 Southeast Data and Assessment Review (SEDAR) 21 stock assessment update for Atlantic dusky sharks. The assessment for dusky sharks indicated that the stock is overfished and experiencing overfishing. Management measures were first proposed to end overfishing and rebuild the stock in Draft Amendment 5 to the 2006 Consolidated HMS FMP (Amendment 5) in response to the 2011 SEDAR 21 stock assessment for dusky sharks; however, after reviewing all of the comments received, NMFS determined that further analyses were necessary on measures pertaining to dusky sharks in a separate FMP amendment, Environmental Impact Statement, and proposed rule. The Magnuson-Stevens Fishery Conservation and Management Reauthorization Act (Magnuson-Stevens Act) requires the Agency to implement management measures as necessary to end overfishing and rebuild overfished stocks. Based on the 2016 stock assessment update for dusky sharks, and after considering comments received for Draft Amendment 5 and on a Predraft for Amendment 5b, NMFS is proposing measures that would reduce fishing mortality on dusky sharks and rebuild the dusky shark population, consistent with all legal obligations.

EXECUTIVE SUMMARY

The National Marine Fisheries Service (NMFS) is considering management measures that would end overfishing and rebuild the overfished Atlantic dusky shark stock.

Atlantic highly migratory species (HMS) are managed under the dual authority of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act (Magnuson-Stevens Act) and the Atlantic Tunas Convention Act. Under the Magnuson-Stevens Act, NMFS must manage fisheries to maintain optimum yield on a continuing basis while preventing overfishing. Under the Atlantic Tunas Convention Act (ATCA), NMFS is authorized to promulgate regulations, as may be necessary and appropriate, to implement the recommendations from the International Commission for the Conservation of Atlantic Tunas (ICCAT). The measures proposed in this amendment and associated rulemaking are taken under the authority of the Magnuson-Stevens Act and consistent with ATCA. Currently, Atlantic sharks, tunas, swordfish, and billfish are managed under the 2006 Consolidated Atlantic HMS Fishery Management Plan (FMP), and its amendments.

NMFS made a stock status determination for dusky sharks as overfished with overfishing occurring after the stock was assessed in the 2010/2011 benchmark stock assessment (SEDAR 21), and announced its intent to prepare an Environmental Impact Statement (EIS) for Amendment 5 to the 2006 Atlantic Consolidated HMS FMP (Amendment 5) (76 FR 62331; October 7, 2011) to address conservation and management of dusky sharks and other Atlantic shark stocks. NMFS considered alternatives for conservation and management measures to end overfishing of and rebuild dusky sharks in Draft Amendment 5 (77 FR 70552, November 26, 2012). NMFS received substantial public comment questioning the bases for and impacts of the dusky shark measures and determined that additional analyses were needed before undertaking measures pertaining to dusky sharks. NMFS then finalized the management measures for the other Atlantic shark species included in Draft Amendment 5 in the Final Amendment 5a and associated final rule (78 FR 40318, July 3, 2013), while dusky shark management measures would be included in a separate rulemaking known as Amendment 5b.

NMFS released a Predraft for Amendment 5b that considered the feedback received on those initial proposals in Draft Amendment 5 and solicited additional public input and consulted with its HMS Advisory Panel at the Spring 2014 meeting (see http://www.nmfs.noaa.gov/sfa/hms/documents/fmp/am5/predraft/a5b_predraft_03-28-14.pdf). The Predraft included alternatives that were beyond the scope of the original proposals as well as new information. In 2014, additional new information regarding dusky sharks was compiled in a comprehensive Endangered Species Act Status Review that was undertaken in response to petitions to list the Northwest Atlantic and Gulf of Mexico population of dusky shark under the Endangered Species Act (http://www.fisheries.noaa.gov/pr/species/fish/dusky-shark.html; 79 FR 74954, December 16, 2014).

Subsequently, in September 2016, an update to the 2010/2011 SEDAR 21 dusky shark stock assessment was completed through the SEDAR process using the most recent time series data through 2015 (http://sedarweb.org/sedar-21). NMFS made a stock status determination in October 2016 that the stock remains overfished with overfishing occurring.

In this document, we consider a reasonable range of alternative management measures to end overfishing and rebuild the dusky shark stock, including: modifying the recreational permitting process and increasing outreach and education; requiring the use of circle hooks by recreational shark fishermen; requiring the use of circle hooks in recreational shark tournaments; modifying the size limit for recreational shark fishing; prohibiting recreational retention of ridgeback sharks; prohibiting retention of all sharks; requiring NMFS-approved shark placards on recreational vessels; establishing protocols for releasing sharks in the pelagic longline fishery; limiting the number of hooks per pelagic longline set; requiring circle hooks in the shark bottom longline fishery; restricting areas to pelagic longline gear; extending a bottom longline time/area closure; closing the Atlantic HMS pelagic longline fishery; establishing individual dusky shark bycatch quotas; and additional outreach and educational training programs. Additionally, we clarify the annual catch limits (ACLs) and accountability measures (AMs) for all prohibited shark species, including dusky sharks.

Consistent with the regulations published by the Council on Environmental Quality, 40 C.F.R. 1501-1508 (CEQ Regulations), we have identified our preferred alternatives. A full description and analysis of the different alternatives can be found in Chapters 2.0 and 4.0 of this document. We have identified preferred alternatives that will, consistent with the Magnuson-Stevens Act and other domestic laws, rebuild and end overfishing of dusky sharks, balance the needs of the fishermen and communities with the needs of the resource, and maximize sustainable fishing opportunities. The list of preferred alternatives can be found below (Table 0.1); the list of the full range of alternatives considered can be found in Chapter 2.0. We will thoroughly consider public comment before finalizing any alternatives, and the proposed measures may be altered or different alternatives adopted at the final rule stage. The CEQ regulations direct Federal agencies to the full extent possible to integrate the requirements of the National Environmental Policy Act with other planning and environmental review procedures required by law or by agency practice so that all procedures run concurrently rather than consecutively. To that end, this document integrates the Draft Environmental Impact Statement (DEIS) required by the National Environmental Policy Act with the fisheries planning and management requirements associated with proposed amendment to a FMP under the Magnuson-Stevens Act, the Initial Regulatory Flexibility Analysis required under the Regulatory Flexibility Act, 5 U.S.C. §§601-603; and the Regulatory Impact Review prepared in accordance with Executive Order 12866, "Regulatory Planning and Review."

Table 0.1 The preferred alternatives in the DEIS for Amendment 5b to the 2006 Consolidated HMS FMP

Recreational Measures	**Preferred Alternatives in DEIS**
Permit Requirements and Outreach	*Alternative A2* Require HMS permit holders fishing for sharks recreationally to obtain a shark endorsement, which requires completion of an online shark identification and fishing regulation training course, plus additional recreational fisheries outreach.
Circle Hook Requirement	*Alternative A6a* Require the use of circle hooks by all HMS permit holders fishing for sharks recreationally and when using natural baits and using wire or heavy (200 lb or greater test) monofilament or fluorocarbon leaders.
Commercial Measures	**Preferred Alternatives in DEIS**
Shark Release Protocol	*Alternative B3* Fishermen with an Atlantic shark limited access permit with pelagic longline gear onboard must release all sharks not being retained using a dehooker or cutting the gangion less than three feet from the hook.
Additional Training Requirements	*Alternative B5* Require completion of a shark identification and fishing regulation training course as a new part of all Safe Handling and Release Workshops for HMS pelagic longline, bottom longline, and shark gillnet vessel owners and operators.
Outreach and Fleet Communication Protocol	*Alternative B6* Increase dusky shark outreach and awareness through development of additional outreach materials, and require HMS pelagic longline, bottom longline, and shark gillnet vessels to abide by a dusky shark fleet communication and relocation protocol.
Circle Hook Requirement	*Alternative B9* Require the use of circle hooks by all HMS directed shark permit holders using bottom longline gear.

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List of Commonly Used Acronyms

AA	Assistant Administrator for Fisheries
ABC	Acceptable biological catch
ACCSP	Atlantic Coastal Cooperative Statistics Program
ACL	Annual catch limit
ACS	Angler consumer surplus
ACT	Annual catch target
ALWTRT/P	Atlantic Large Whale Take Reduction Team/Plan
AM	Accountability measure
ANPR	Advanced notice of proposed rulemaking
AOCTRP	Atlantic Offshore Cetacean Take Reduction Plan
AP	Advisory panel
APA	Administrative Procedure Act
ASMFC	Atlantic States Marine Fisheries Commission
ATCA	Atlantic Tunas Convention Act
B	Biomass
BAYS	Bigeye, albacore, yellowfin, skipjack tunas
BFT	Bluefin tuna
BiOp	Biological opinion
B_{MSY}	Biomass expected to yield maximum sustainable yield
B_{OY}	Biomass expected to yield optimum yield
CAR	Caribbean
CFMC	Caribbean Fishery Management Council
CFL	Curved fork length
CFR	Code of Federal Regulations
CHB	Charter/headboat
CIE	Center for Independent Experts
CITES	Convention on International Trade in Endangered Species of Wild Fauna and Flora
COASTSPAN	Cooperative Atlantic States Shark Pupping and Nursery survey
CPC	Contracting parties, non-contracting parties, entities, or fishing entities
CPUE	Catch per unit effort
CSFOP	Commercial shark fishery observer program
CZMA	Coastal Zone Management Act
DEIS	Draft environmental impact statement
DPS	Distinct population segment
dw	Dressed weight
EA	Environmental assessment
EEZ	Exclusive economic zone
EFH	Essential fish habitat
EFP	Exempted fishing permit
EIS	Environmental impact statement
EO	Executive order
ESA	Endangered Species Act
F	Instantaneous fishing mortality
FAD	Fish aggregating device
FAO	Food and Agriculture Organization
FEC	Florida East coast
FEIS	Final environmental impact statement
FL	Fork length
FMP	Fishery management plan
F_{MSY}	Instantaneous fishing mortality rate expected to yield maximum sustainable yield
FMU	Fishery management unit
F_{OY}	Fishing mortality rate expected to yield optimum yield
FR	Federal Register
FRFA	Final regulatory flexibility analysis
GOM	Gulf of Mexico
GSAFF	Gulf and South Atlantic Fishery Foundation
GMFMC	Gulf of Mexico Fishery Management Council
GULFSPAN	Gulf of Mexico Shark Pupping and Nursery survey
GSMFC	Gulf States Marine Fisheries Commission
GRA	Gear Restricted Area
HAPC	Habitat area of particular concern
HMS	Highly migratory species: Atlantic sharks, tunas, swordfish, and billfish
HMS FMP	Consolidated Highly Migratory Species Fishery Management Plan
IBQ	Individual bluefin [tuna] quota
ICCAT	International Commission for the Conservation of Atlantic Tunas
IMO	International Maritime Organization
IPOA	International plan of action
IRFA	Initial regulatory flexibility analysis
ITP	International trade permit
ITQ	Individual transferable quota
ITS	Incidental take statement
IUU	Illegal, unreported, unregulated
LAP	Limited access permit
LCS	Large coastal sharks
LOA	Letter of acknowledgment
LPS	Large Pelagics Survey
LWTRT/P	Large Whale Take Reduction Team/Plan
MAB	Mid Atlantic Bight
MAFMC	Mid-Atlantic Fishery Management Council
Magnuson-Stevens Act	Magnuson-Stevens Fishery Conservation and Management Act

MFMT	Maximum fishing mortality threshold
MMPA	Marine Mammal Protection Act
MPA	Marine protected area
MRFSS	Marine Recreational Fishing Statistics Survey
MRIP	Marine Recreational Information Program
MSST	Minimum stock size threshold
MSY	Maximum sustainable yield
mt	Metric tons
NCA	North Central Atlantic
NEC	Northeast Coastal
NED	Northeast Distant Waters
NEFMC	New England Fishery Management Council
NEFSC	Northeast Fisheries Science Center
NEPA	National Environmental Policy Act
GARFO	Greater Atlantic Regional Fisheries Office
NGO	Non-governmental organization
nmi	Nautical mile
NOA	Notice of Availability
NMFS	National Marine Fisheries Service
NOAA	National Oceanographic and Atmospheric Administration
NOI	Notice of Intent
NPOA	National Plan of Action
NS	National Standards
NWGB	National Working Group on Bycatch
OSF	Office of Sustainable Fisheries
OY	Optimum yield
PLTRT/P	Pelagic Longline Take Reduction Team/Plan
PLL	Pelagic longline
POP	Pelagic observer program
OPR	Office of Protected Resources
PRA	Paperwork Reduction Act
Reg Flex Act	Regulatory Flexibility Act
RFMO	Regional Fishery Management Organization
RIR	Regulatory Impact Review
RPAs	Reasonable and Prudent Alternatives
RPMs	Reasonable and Prudent Measures
SAB	South Atlantic Bight
SAFE	Stock Assessment and Fishery Evaluation
SAFMC	South Atlantic Fishery Management Council
SAR	Sargasso
SBRM	Standardized bycatch reporting methodology
SCRS	Standing Committee for Research and Statistics
SCS	Small coastal sharks
SDC	Status determination criteria
SEFSC	Southeast Fisheries Science Center
SEIS	Supplemental environmental impact statement
SERO	Southeast Regional Office
SEW	Stock evaluation workshop
SFA	Sustainable Fisheries Act
SFL	Straight fork length
SRP	Scientific research permit
SSB	Spawning stock biomass
SWO	Swordfish
TAC	Total allowable catch
TAL	Total allowable landings
TCs	Terms and Conditions
TL	Total length
TUN	Tuna North
TUS	Tuna South
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service
UVI	Unique Vessel Identifier
VMS	Vessel monitoring system
VTR	Vessel trip report
WTP	Willingness to pay
ww	Whole weight
YOY	Young of the year

1.0 Introduction

Atlantic highly migratory species[1] (HMS) are managed under the dual authority of the Magnuson-Stevens Fishery Conservation and Management Reauthorization Act (Magnuson-Stevens Act) and the Atlantic Tunas Convention Act. Under the Magnuson-Stevens Act, the National Marine Fisheries Service (NMFS) must, consistent with ten National Standards, manage fisheries to maintain optimum yield on a continuing basis while preventing overfishing. Under the Atlantic Tunas Convention Act (ATCA), the Secretary of Commerce shall promulgate such regulations as may be necessary and appropriate to carry out International Commission for the Conservation of Atlantic Tunas (ICCAT) recommendations. The management measures proposed for this Fishery Management Plan (FMP) amendment and associated rulemaking, which address dusky sharks, are taken under the authority of the Magnuson-Stevens Act. In addition to the Magnuson-Stevens Act, any management measures must also be consistent with other applicable laws including, but not limited to, the National Environmental Policy Act (NEPA), the Endangered Species Act (ESA), the Marine Mammal Protection Act (MMPA), and the Coastal Zone Management Act (CZMA). This document is prepared, in part, to comply with our responsibilities under the National Environmental Policy Act, as implemented by the regulations published by the Council on Environmental Quality, 50 C.F.R. Parts 1501-1508, and National Marine Fisheries Service Administrative Order 216-6.

NMFS previously considered alternatives for management of dusky sharks in Draft Amendment 5 (77 FR 70552, November 26, 2012), which proposed measures that were designed to reduce fishing mortality and effort in order to rebuild various overfished Atlantic shark species, including dusky sharks, while ensuring that a limited sustainable shark fishery for certain species could be maintained consistent with legal obligations and the 2006 Consolidated HMS FMP. Specifically, NMFS in that draft amendment considered a range of alternatives from the No Action alternative of keeping status quo measures to alternatives that would prohibit the use of pelagic longline gear in the Charleston Bump time/area closure area during the month of May, implementing dusky shark bycatch caps in the pelagic longline fishery, and establishing eight potential new pelagic longline closures based on where high levels of dusky shark interactions were reported in the HMS logbook from 2008-2010. Within the range of alternatives, NMFS also considered making changes to the timing of the mid-Atlantic shark bottom longline closed area, modifying the existing bottom longline shark research fishery to reduce interactions with dusky sharks, and prohibiting the use of bottom longline and pelagic longline gear in all Atlantic HMS fisheries. In the recreational fishery, NMFS proposed to increase the recreational minimum size limit as well as considered increasing outreach to the recreational community regarding shark identification, increasing the size limit, and prohibiting additional species.

During the comment period on Draft Amendment 5, NMFS received significant public comment and feedback from its Advisory Panel on the proposed dusky shark measures regarding the data sources used and the analyses of these data. NMFS also received many comments requesting consideration of approaches to dusky shark fishery management that were significantly different

[1]The Magnuson-Stevens Act, at 16 U.S.C. 1802(14), defines the term "highly migratory species" as tuna species, marlin (*Tetrapturus* spp. and *Makaira* spp.), oceanic sharks, sailfishes (*Istiophorus* spp.), and swordfish (*Xiphias gladius*)."

from those NMFS proposed and analyzed in the Amendment 5 proposed rule and DEIS. For example, commenters suggested exemptions to the proposed recreational minimum size increase that would protect dusky sharks but still allow landings of other sharks--such as blacktip, blue, shortfin mako and thresher sharks--and other commenters suggested implementing gear restrictions instead of additional pelagic longline closures. After reviewing all of the comments received, NMFS concluded that further analyses were needed for dusky shark measures and decided to conduct further analyses on those measures pertaining to dusky sharks in a separate FMP amendment, EIS, and proposed rule. NMFS then finalized management measures for the other Atlantic shark species included in Draft Amendment 5 in the Final Amendment 5a and associated final rule (78 FR 40318, July 3, 2013), while dusky shark management measures would be included in an upcoming, separate rulemaking known as Amendment 5b.

NMFS prepared the Predraft for Amendment 5b that considered the feedback received on Draft Amendment 5 and solicited additional public input and consulted with its HMS Advisory Panel at the Spring 2014 meeting. The Predraft considered public comment on Draft Amendment 5 as well as alternatives that were not included in Draft Amendment 5 and new information that met the purpose and need of Amendment 5b.

The Predraft for Amendment 5b described eight reasonable alternatives for recreational measures that included creating a shark endorsement on HMS recreational fishing permits, increasing public outreach, prohibition of all ridgeback sharks in the Atlantic recreational shark fishery, modifying the Atlantic States Marine Fisheries Commission (ASMFC) state recreational shark seasonal closure, increasing the recreational minimum size for all sharks, creating a catch and release only recreational shark fishery, and closing the Atlantic recreational shark fishery. The Predraft also described ten reasonable alternatives for the commercial pelagic longline fishery including reducing the number of hooks allowed on pelagic longline trips for fishing vessels with shark permits, requiring the use of weak hooks, requiring the use of a dehooker for sharks not landed with pelagic longline gear, developing closures in areas with high dusky interactions or "hotspots", allowing conditional access to dusky hotspot closed areas, enforcing depth restrictions, increasing outreach throughout the pelagic fleet and creating a dusky shark fleet communication and relocation protocol, working with the ASMFC to modify the state commercial shark seasonal closure, and removing pelagic longline gear as an authorized gear for commercial Atlantic shark fishing. The goal of those alternatives was to end overfishing and rebuild dusky sharks in a manner that maximizes resource sustainability, while minimizing, to the greatest extent possible, the socioeconomic impacts on affected fisheries.

Following the Predraft for Amendment 5b, additional information regarding dusky sharks became available that was not available at the time of the SEDAR 21 stock assessment. NMFS, in response to two petitions from environmental groups regarding listing dusky sharks under the Endangered Species Act (ESA), conducted an ESA Status Review for the Northwest Atlantic population of dusky sharks, which was completed in October 2014. That status review included an updated analysis of three fishery-independent surveys, the Northeast Fisheries Science Center (NEFSC) Coastal Shark Bottom Longline Survey (NELL), the Virginia Institute of Marine Science Shark Longline Survey (VIMS LL), and the University of North Carolina Shark Longline Survey (UNC LL), using the same methodology as the SEDAR 21 Data Workshop (McCandless et al., 2014). The updated analysis included data from 2010 – 2012 and showed an

increasing trend in dusky shark indices of abundance for all three surveys since 2009, the terminal year of data used for dusky sharks in the SEDAR 21 stock assessment. The ESA Status Review Team concluded that, based on the most recent stock assessment, abundance projections, updated analyses, and the potential threats and risks to population extinction, the dusky shark population in the Northwest Atlantic and Gulf of Mexico has a low risk of extinction currently and in the foreseeable future. On December 16, 2014, NMFS announced a 12-month finding that determined that the Northwest Atlantic and Gulf of Mexico population of dusky sharks did not warrant listing under the ESA at that time (79 FR 74954).

NMFS applied additional restrictions in the shark research fishery to reduce dusky shark mortality in 2013. This included establishing a dusky shark interaction cap for the entire shark research fishery of 45 dusky sharks per year, with more specific caps within the regions, which has been an effective way to minimize dusky shark dead discards within the limited shark research fishery, which only involves 6 to 10 participants annually.

By Fall 2015, as described in an HMS staff presentation to its Advisory Panel, the reductions in dusky shark mortality since 2009, and the increasing population trends from fishery-independent surveys, had indicated that management actions may have already reduced dusky shark mortality to levels prescribed by the SEDAR 21 stock assessment (i.e., reduced mortality by at least 58 percent against 2009 levels). In light of this updated information, the Southeast Fisheries Science Center (SEFSC) prioritized an update of the SEDAR 21 dusky shark stock assessment using data through 2015, to be completed in summer 2016. It was determined that further action on Amendment 5b should wait until after the completion of the assessment update to ensure that it was based on the best available scientific information.

On October 27, 2015, the environmental advocacy organization, Oceana, filed a complaint against NMFS in Federal district court alleging violations of the Magnuson-Stevens Act and Administrative Procedure Act with respect to delays in taking action to rebuild and end overfishing of dusky sharks. A settlement agreement was reached between NMFS and the Plaintiffs on May 18, 2016, regarding the timing of the pending agency action. This settlement acknowledged that NMFS was in the process of developing an action to address overfishing and rebuilding of dusky sharks and that an assessment update was ongoing and stipulated that, based upon the results of the assessment update, NMFS would submit a proposed rule to the *Federal Register* no later than October 14, 2016.

A draft of the SEDAR 21 stock assessment update for dusky sharks became available in July 2016 and underwent internal NMFS peer review in August 2016. The details of this assessment update are given in Section 1.2 below. Despite including much of the same data as those used in the 2014 ESA Dusky Shark Status Review Report (McCandless et al., 2014), which suggested mostly positive trends in dusky shark relative abundance, the 2016 assessment update concluded that the stock is still overfished and experiencing overfishing, although the level of overfishing has decreased compared to previous assessments and is low.

Based on the comments received on Draft Amendment 5, the Predraft for Amendment 5b, consultations and updates with the HMS Advisory Panel at its bi-annual meetings, input from the regulated community and public, and the results of the 2016 Southeast Data, Assessment, and

Review (SEDAR) 21 dusky shark stock assessment update (SEDAR 2016a and 2016b), NMFS has now developed Draft Amendment 5b. Some of the alternatives included in the Predraft for Amendment 5b are included in this draft Amendment; however, other alternatives have been changed or added based on public comment on the Predraft for Amendment 5b and the results of the SEDAR 21 stock assessment update.

The alternatives would affect the recreational shark and commercial HMS fisheries and the alternatives are listed in those two separate categories for ease of understanding. NMFS considers a range of alternatives for each category that would meet the purpose and need of this amendment, which includes, among other things, ending overfishing on and rebuilding dusky sharks. The alternatives are all described in detail in Chapter 2.0.

1.1 Brief Management History

This section provides a brief overview of HMS management. More detail regarding the history of Atlantic shark management can be found in Section 3.1.

In 1989, the Regional Fishery Management Councils requested that the Secretary of Commerce manage Atlantic sharks. On November 28, 1990, the President of the United States signed into law the Fishery Conservation Amendments of 1990 (Pub. L. 101-627). This law amended the Magnuson Fishery Conservation and Management Act (later renamed the Magnuson-Stevens Fishery Conservation and Management Act or Magnuson-Stevens Act) and gave the Secretary the authority (effective January 1, 1992) to manage HMS in the exclusive economic zone of the Atlantic Ocean, Gulf of Mexico, and Caribbean Sea under authority of the Magnuson-Stevens Act (16 U.S.C. §1811). This law also transferred from the Fishery Management Councils to the Secretary, effective November 28, 1990, the management authority for HMS in the Atlantic Ocean, Gulf of Mexico, and Caribbean Sea (16 U.S.C. §1854(f)(3)). At this time, the Secretary delegated authority to manage Atlantic HMS to NMFS.

NMFS finalized the first Atlantic Shark FMP in 1993. The 1993 FMP established many of the management measures still in place today including permitting and reporting requirements, management complexes, commercial quotas, and recreational bag limits. In 1999, NMFS revised the 1993 FMP and included swordfish and tunas in the 1999 FMP for Atlantic Tunas, Swordfish, and Sharks (NMFS 1999). The 1999 FMP included several shark conservation and management measures including prohibiting the retention and landing of dusky and several other species of shark; this prohibition on retention and landing went into effect in 2000. The prohibition on dusky sharks was implemented because NMFS determined that the species could not support a directed, sustainable fishery, despite often being targeted in recreational and commercial fisheries (64 FR 29090; May 28, 1999). NMFS later developed specific criteria (50 CFR 635.34(c)) for retaining, adding, or removing species from the prohibited shark species group. A species can be added if it meets at least 2 of the 4 criteria, and NMFS can remove a species if it is found to no longer meet at least 2 of the criteria.) In 2003, NMFS amended the 1999 FMP; this amendment included several measures designed to reduce fishing mortality on dusky sharks including an area closed to bottom longline fishing off North Carolina (NMFS 2003). NMFS then consolidated the 1999 FMP and its amendments and the Atlantic Billfish FMP and its amendments in the 2006 Consolidated Atlantic HMS FMP (NMFS 2006). In the

2006 Consolidated Atlantic HMS FMP, NMFS began requiring all shark dealers to attend shark identification workshops every three years. Since then, the 2006 Consolidated HMS FMP has been amended several times.

Of relevance to this action, in 2008, NMFS published Amendment 2 to the 2006 Consolidated HMS FMP (Amendment 2) (NMFS 2008a and NMFS 2008b), which among other things, established a rebuilding plan for dusky sharks. NMFS has prohibited the retention of dusky sharks in commercial and recreational fisheries since 2000. In 2008, in response to a 2006 stock assessment declaring dusky sharks to be overfished with overfishing occurring despite this complete prohibition, NMFS adopted a rebuilding plan for the stock. This rebuilding plan, set out in Amendment 2 to the Consolidated HMS FMP, undertook a suite of measures to address dusky shark overfishing, focusing primarily on bycatch of the species in other shark fisheries. Major components of this plan—which are unchanged by this action—include a continued prohibition on retention of dusky sharks (§§ 635.22(c)(4) and 635.24(a)(5)), time/area closures (§ 635.21(d)), and the prohibition of landing sandbar sharks (the historic target species for the large coastal shark fishery) outside of the shark research fishery along with significant retention limit reductions in the bottom longline fishery where interactions were commonly occurring (§§ 635.24(a)(1), (2), and (3)). The terminal year for rebuilding was set at 2108, consistent with the assessment, which concluded that the stock could rebuild within 100 to 400 years. In 2011, three years into this 100-year rebuilding plan, a benchmark stock assessment for dusky sharks was completed through the Southeast Data, Assessment, and Review (SEDAR) 21 process (76 FR 62331, October 7, 2011), the first assessment for dusky sharks conducted within the SEDAR process. The 2011 stock assessment provided an update to a 2006 dusky shark stock assessment and concluded that the stock remained overfished with overfishing occurring.

On October 7, 2011 (76 FR 62331), NMFS made stock status determinations for several shark species based on the results of the SEDAR 21 process. NMFS determined in the notice that dusky sharks, a prohibited species, were still overfished and still experiencing overfishing (i.e., their stock status has not changed from a 2006 assessment). The stock assessment recommended a decrease in dusky shark mortality of 58 percent against 2009 levels. NMFS announced its intent to prepare an Environmental Impact Statement (EIS) for Amendment 5 to the 2006 Atlantic Consolidated HMS FMP, which would assess the potential effects on the human environment of additional action proposed through rulemaking to rebuild and end overfishing of several stocks assessed in SEDAR 21, including dusky sharks, consistent with the Magnuson-Stevens Act.

Under the Magnuson-Stevens Act, NMFS is responsible for managing Atlantic HMS and must comply with all applicable provisions of the Magnuson-Stevens Act when it prepares and amends its FMP and implementing regulations (16 U.S.C. §1852(a)(3)). NMFS must maintain optimal yield of each fishery while preventing overfishing (16 U.S.C. §1851(a)(1)). Where a fishery is determined to be in or approaching an overfished condition, NMFS must include in its FMP conservation and management measures to prevent or end overfishing and rebuild the fishery, stock or species (16 U.S.C. §§1853(a)(10); 1854(e)). In preparing and amending an FMP, NMFS must, among other things, consider the Magnuson-Stevens Act's ten National Standards, including a requirement to use the best scientific information available as well as to consider potential impacts on residents of different States, efficiency, costs, fishing communities,

bycatch, and safety at sea (16 U.S.C. §1851 (a)(1-10)). The Magnuson-Stevens Act also has a specific section that addresses preparing and implementing FMPs for Atlantic HMS (16 U.S.C. §1854 (g)(1)(A-G)). In summary, this section addressing Atlantic HMS includes, but is not limited to, requirements to:

- Consult with and consider the views of affected Councils, Commissions, and advisory groups;
- Evaluate the likely effects of conservation and management measures on participants and minimize, to the extent practicable, any disadvantage to U.S. fishermen in relation to foreign competitors;
- Provide fishing vessels with a reasonable opportunity to harvest any allocation or quota authorized under an international fishery agreement;
- Diligently pursue, through international entities (such as the International Commission for the Conservation of Atlantic Tunas), comparable international fishery management measures; and,
- Ensure that conservation and management measures promote international conservation of the affected fishery, take into consideration traditional fishing patterns of fishing vessels, are fair and equitable in allocating fishing privileges among U.S. fishermen and do not have economic allocation as the sole purpose, and promote, to the extent practicable, implementation of scientific research programs that include the tagging and release of Atlantic HMS.

1.2 Rebuilding and Preventing Overfishing of Atlantic Sharks

Under National Standard 1 of the Magnuson-Stevens Act, as implemented by the National Standard 1 Guidelines (50 CFR 600.310), NMFS is required to "prevent overfishing while achieving, on a continuing basis, the optimum yield from each fishery for the U.S. fishing industry." In order to accomplish this, NMFS must determine the maximum sustainable yield (MSY) and specify status determination criteria (i.e., maximum fishing mortality threshold and minimum stock size threshold) to allow a determination of the status of the stock. In cases where the fishery is overfished, NMFS must take action to rebuild the stock.

Stock Status and Status Determination Criteria

Overfishing occurs when a stock or stock complex is subjected to a level of fishing mortality or annual total catch that jeopardizes the capacity of a stock or stock complex to produce MSY on a continuing basis (see definition at 50 CFR§ 600.310(e)(2)(i)(B)). The 1999 FMP established the maximum fishing mortality threshold as F_{MSY}. F_{MSY} is defined as the fishing mortality level necessary to produce MSY on a continuing basis. If the maximum fishing mortality threshold (MFMT) exceeds F_{MSY} for more than one year, then the stock is considered to be subject to overfishing, and remedial action must be taken.

The 1999 FMP established the minimum stock size threshold as $(1\text{-}M)B_{MSY}$ when natural mortality (M) is less than 0.5. Most species of sharks have natural mortality less than 0.5. When the stock falls below minimum stock size threshold (MSST), the stock is overfished and remedial action must be taken to rebuild the stock. Stocks are considered rebuilt when current biomass

levels are equal to B_{MSY}. B_{MSY} is the level of stock abundance at which harvesting the resource can be sustained on a continual basis at the level necessary to support MSY. Stocks are considered healthy when fishing mortality (F) is less than or equal to 0.75 F_{MSY} and biomass is greater than or equal to B_{OY} (the biomass level necessary to produce optimum yield on a continuing basis). In summary, the thresholds used to calculate the status of Atlantic sharks are as follows:

- MFMT = F_{limit} = F_{MSY};
- Overfishing is occurring when $F_{year} > F_{MSY}$;
- MSST = B_{limit} = (1-M)B_{MSY} when M < 0.5 = 0.5B_{MSY} when M >= 0.5;
- Overfished when B_{year}/B_{MSY} < MSST;
- Biomass target during rebuilding = B_{MSY};
- Fishing mortality during rebuilding < F_{MSY};
- Fishing mortality for healthy stocks = 0.75F_{MSY};
- Biomass for healthy stocks = BOY = ~1.25 to 1.30B_{MSY};
- Minimum biomass flag = (1-M)B_{OY}; and
- Level of certainty of at least 50 percent required but depends on species and circumstances; for Atlantic HMS sharks, the level of certainty used has typically been 70 percent.
- For sharks, in some cases, spawning stock fecundity (SSF) or spawning stock number (SSN) is used as a proxy for biomass since biomass does not influence pup production in sharks.

In the 1999 FMP, and maintained in the 2006 Consolidated HMS FMP, NMFS outlined stock status determination criteria and a set of rebuilding targets for all HMS. This amendment does not change these criteria or targets that are summarized above. Applying these criteria, NMFS recently determined that the status of dusky sharks is overfished with overfishing occurring, as discussed in greater detail in Section 1.2.

Annual Catch Limits and Accountability Measures

Congress amended the Magnuson-Stevens Act in 2007 to require that each FMP establish a mechanism for specifying annual catch limits (ACLs) at a level that will prevent overfishing and include accountability measures (AMs) to ensure ACLs are not exceeded (16 U.S.C. 1853(a)(15)). NMFS amended its 2006 Consolidated HMS FMP in 2010 to address these requirements for shark stocks in Amendment 3 (NMFS 2010). For all sharks managed pursuant to the 2006 Consolidated HMS FMP and its amendments, the methods to adjust ACLs as needed and apply AMs are:

- Overfishing Limit > Acceptable Biological Catch (ABC) $\geq$ ACL (unless estimates of ABC are available);
- Overfishing Limit = the annual amount of catch that corresponds to the estimate of MFMT applied to a stock's abundance relative to F;
- ABC = to be determined by future stock assessments, as appropriate; thus, in some cases, NMFS assumes ABC = ACL;

- Total Allowable Catch (TAC) = the maximum amount of fish that can be sustainably caught in a given year;
- ACL = TAC; for overfished stocks, this will be the projection that shows 70 percent probability of rebuilding (in some cases, ABC=ACL=TAC);
- Commercial quota = landings component of the sector ACL; and
- Accountability Measures = restrictions on use of over- and underharvests and closing the fishery when commercial landings are at or projected to be at 80 percent of the quota.

There are 18 shark management groups (Table 1.1) that contain shark species (23 species) that legally may be harvested in commercial and recreational fisheries. These management groups are subject to management measures such as permitting and reporting requirements, commercial quotas, gear regulations, closed areas, closed seasons, observer coverage, vessel monitoring requirements, etc. For example, a limited access directed shark permit is necessary to commercially fish for and retain aggregated large coastal sharks (LCS), and vessels are limited to a default of 45 non-sandbar LCS per trip, with a range from 0-55 non-sandbar LCS per trip, established via inseason action considering regulatory criteria. All of these management groups have established ACLs and AMs as prescribed above.

There are 19 species of sharks in the prohibited shark complex (Table 1.2), and all of these species are explicitly prohibited from commercial and recreational retention. NMFS currently considers four criteria (50 CFR 635.34(c)) when adding or removing species from the prohibited shark species group. A species can be added if it meets at least 2 of the 4 criteria, and NMFS can remove a species if it is found to longer meet at least 2 of the criteria. The criteria are: 1) Biological information indicates that the stock warrants protection; 2) Information indicates that the species is rarely encountered or observed caught in HMS fisheries; 3) Information indicates that the species is not commonly encountered or observed caught as bycatch in fishing operations for species other than HMS; and, 4) The species is difficult to distinguish from other prohibited species.

The Magnuson-Stevens Act requires that each FMP establish a mechanism for specifying ACLs at a level such that overfishing does not occur, including measures to ensure accountability (AMs) (16 U.S.C. 1853(a)(15)). In 2010, NMFS addressed these requirements for Atlantic highly migratory shark stocks in Amendment 3 to the 2006 Consolidated HMS FMP (Amendment 3) (NMFS 2010), including sharks in the prohibited shark complex, which includes dusky sharks (Figure 1.1). Draft Amendment 5b clarifies that the ACL for the 19 species of sharks in the prohibited shark complex is zero. NMFS believes that an ACL of zero is appropriate and, along with existing and proposed conservation and management measures, will prevent overfishing.

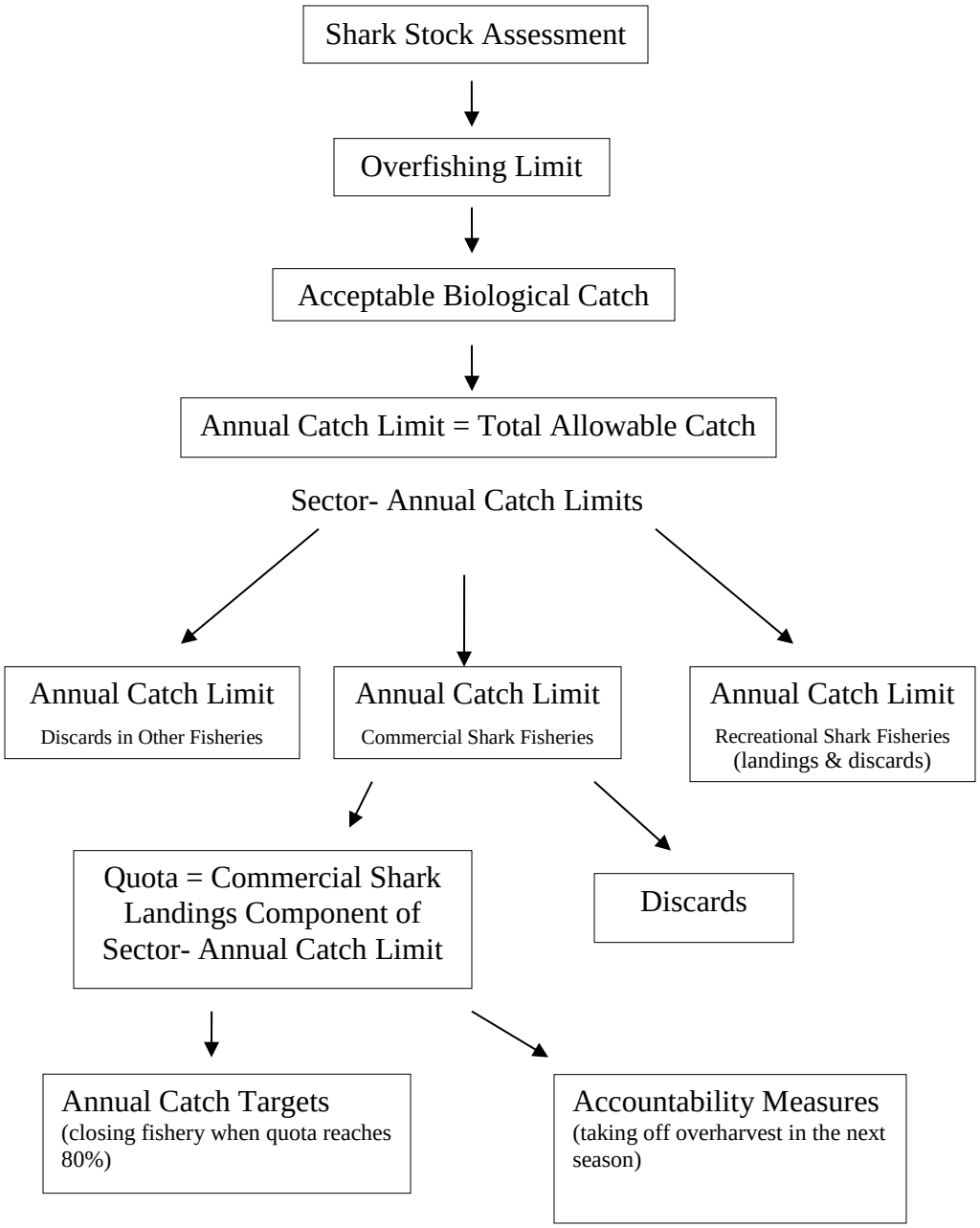

Figure 1.1 Generalized mechanism for establishing Acceptable Biological Catches/Annual Catch Limits established in Amendment 3.

Table 1.1 Atlantic shark management groups that are available for commercial and recreational harvest.

Region or Sub-region	Management Group
Eastern Gulf of Mexico	Blacktip Sharks
	Aggregated Large Coastal Sharks
	Hammerhead Sharks
Western Gulf of Mexico	Blacktip Sharks
	Aggregated Large Coastal Sharks
	Hammerhead Sharks
Gulf of Mexico	Non-Blacknose Small Coastal Sharks
	Smoothhound Sharks
Atlantic	Aggregated Large Coastal Sharks
	Hammerhead Sharks
	Non-Blacknose Small Coastal Sharks
	Blacknose Sharks (South of 34° N. lat. only)
	Smooth Dogfish Sharks
No regional quotas	Non-Sandbar LCS Research
	Sandbar Shark Research
	Blue Sharks
	Porbeagle Sharks
	Pelagic Sharks Other Than Porbeagle or Blue

Table 1.2 Shark species included in the prohibited shark complex.

Basking *Cetorhinus maximus*	Dusky *Carcharhinus obscurus*	Sand Tiger *Carcharias taurus*	Sevengill *Heptranchias perlo*	Bigeye Sand Tiger *Odontaspis noronhai*
Bigeye Thresher *Alopias superciliosus*	Galapagos *Carcharhinus galapagensis*	Whale *Rhincodon typus*	Sixgill *Hexanchus griseus*	Bigeye Sixgill *Hexanchus nakamurai*
Bignose *Carcharhinus altimus*	Longfin Mako *Isurus paucus*	White *Carcharodon carcharias*	Narrowtooth *Carcharhinus brachyurus*	Smalltail *Carcharhinus porosus*
Caribbean Reef *Carcharhinus perezi*	Night *Carcharhinus signatus*	Atlantic Angel *Squatina dumeril*	Caribbean Sharpnose *Rhizoprionodon porosus*	

In its proposed revisions to the NS 1 guidelines (80 FR 2786; January 20, 2015), NMFS explains in § 600.310(g)(3) that if an ACL is set equal to zero and the AM for the fishery is a closure that prohibits fishing for a stock, additional AMs are not required if only small amounts of catch (including bycatch) occur, and the catch is unlikely to result in overfishing. According to the available analyses, prohibited shark species—basking sharks (Campana, 2008), night sharks (Carlson et al. 2008), sand tiger sharks (Carlson et al., 2009), white sharks (Curtis et al. 2014), and bigeye thresher sharks (Young et al., 2016)—are not experiencing overfishing. While such analyses have not been completed for all other prohibited shark species, there is no information suggesting that overfishing is occurring on other members of this complex (except for dusky sharks, which is addressed in this action). In addition, commercial and recreational retention of prohibited sharks is prohibited, and there is only a small amount of bycatch occurring for the complex.

NMFS acknowledges that, in addition to the small amount of bycatch, there is also information on a small amount of occasional prohibited shark landings. Based on observer and other data and input from the HMS AP, NMFS believes that these landings most likely are due to misidentification issues and lack of awareness of shark fishing regulations, which would be addressed through this action. Even though dusky sharks are experiencing overfishing, NMFS believes that an ACL of zero is still appropriate for the prohibited shark complex. The estimated level of overfishing for dusky sharks is not high (median F_{2015}/F_{MSY} is 1.18; values >1 indicates overfishing), and measures under Draft Amendment 5b and this proposed rule are expected to prevent this overfishing. NMFS notes that there would be policy and scientific/data concerns if we were to specify an ACL other than zero. As noted earlier, there was a high level of uncertainty in the 2016 assessment update, given limited data on dusky sharks, multiple data sources, and five plausible model scenarios. The update had five different total allowable catch (TAC) estimates ranging from 7,117 to 47,400 lb (3.2 to 21.5 mt) dressed weight (median = 27,346 lb (12.4 mt) dressed weight). NMFS does not have a basis for picking one model over another, and is concerned that setting an ACL based on the highly uncertain TAC estimates could encourage increased catch. Retention of dusky sharks is prohibited, thus NMFS believes that the ACL for dusky sharks (along with other species in the prohibited shark complex) should be zero.

NMFS is obligated by National Standard 9 of the Magnuson-Stevens Act (16 U.S.C. 1851(a)(9)) to minimize bycatch and bycatch mortality. National Standard 9 guidelines at 50 C.F.R.§ 600.350(d) instruct Fishery Management Councils and the Secretary to evaluate conservation and management measures, and evaluate total fishing mortality, by promoting development of a database on bycatch and bycatch mortality in the fishery to the extent practicable. To better understand the scope of bycatch and bycatch mortality occurring on the prohibited shark complex, including dusky sharks, NMFS has compiled the reported mortalities of prohibited sharks from 2008 – 2015. These data include not only prohibited sharks that were discarded dead, but also prohibited sharks that were landed illegally, most likely due to misidentification issues and lack of awareness of shark fishing regulations. Data were used from the following sources:

- Dead discards and landings reported by the Atlantic Shark Bottom Longline Observer Program
- Dead discards and landings reported by the Atlantic Shark Gillnet Observer Program

- Dead discards and landings reported by the Atlantic Pelagic Observer Program
- Dead discards and landings reported by the Northeast Fisheries Observer Program
- Dead discards and landings reported through the Atlantic HMS Exempted Fishing Permit Program
- Estimated recreational dead discards and landings from the Marine Recreational Information Survey (MRIP)

The time series used to evaluate the impact of conservation and management measures and total fishing mortality on the prohibited shark complex begins in 2008 to coincide with the implementation of Amendment 2. Amendment 2 modified and established regulations in the shark fishery that dramatically changed how the directed shark fishery operates. These regulations included, but were not limited to, requiring fins remain naturally attached, reducing the commercial trip limit from 4,000 lb dw to 36[2] non-sandbar LCS per trip, and prohibiting the retention of sandbar sharks outside a limited shark research fishery.

As seen in Table 1.3, the annual number of observed prohibited shark bycatch mortalities ranged from 293 to 1,829 sharks per year over the time series. Because many of these species were prohibited because they were rarely caught or because of concern over the status of the species (NMFS 1999), it is not surprising that the number of observed or reported landings and dead discards are highly variable between years. However, this variability makes it difficult to determine an appropriate number to use for an ACL (other than "equal to zero").

The time series NMFS used to evaluate the impact of conservation and management measures and fishing mortality on the prohibited shark complex begins in 2008 to coincide with the implementation of Amendment 2 and ends in 2015, the most recent year for which data are available. Bycatch data are not available in as timely a manner as data on landed catch, and interactions with prohibited sharks are rare events, which can be highly variable from year to year. According to the guidelines at 50 C.F.R.§ 600.310(g)(4), if there are insufficient data upon which to compare catch to ACL, AMs can be based on comparisons of average catch to average ACL over an appropriate multi-year period. Because of the limited amount of data available for the prohibited shark complex, and highly variable interannual observed catches, it is appropriate to base the application of ACLs and AMs using a multi-year average. Thus, three-year rolling averages were used to smooth interannual variability in the observed catches. Table 1.4 presents the rolling 3-year averages from 2008 through 2015.

The most recent three-year average was 498 prohibited shark species observed per year (the three-year averages in that time frame ranged from 498 to 1,434 per year; mean = 921 per year). We consider this a small amount of observed catch, and unlikely to result in overfishing. The best available data for most of the shark populations in the prohibited shark complex indicate that overfishing is not occurring, including data for basking sharks (Campana 2008), night sharks (Carlson et al. 2008), sand tiger sharks (Carlson et al., 2009), white sharks (Curtis et al. 2014), and bigeye thresher sharks (Young et al. 2016). Additionally, recent management actions (including not only regulations from Amendment 2 but also regulations established in other

2 The final rule for Amendment 6 to the 2006 Consolidated HMS FMP (80 FR 50073; August 8, 2015) changed the non-sandbar LCS trip limit to a default of 45 per trip with a range that can be adjusted from 0 to 55 sharks.

actions such as the requirement for shark dealers to be fully trained in species identification and the bottom longline closed area off North Carolina) have, to the extent practicable, minimized bycatch and bycatch mortality of sharks other than dusky sharks in the prohibited shark complex. Dusky shark bycatch mortality, which based on the 2016 SEDAR 21 assessment update remains too high, is being specifically addressed by this rulemaking.

Table 1.3 Observed shark mortality (dead discards and kept in numbers of sharks) in the prohibited shark complex from 2008-2015.

Species	**2008**	**2009**	**2010**	**2011**	**2012**	**2013**	**2014**	**2015**
Basking	0	2	19	24	19	19	40	13
Bigeye Thresher	49	57	39	24	32	33	27	39
Bignose	1	0	1	0	0	0	0	1
Caribbean Reef	3	13	0	5	522	1	1	0
Dusky	1,591	724	694	230	706	53	649	141
Galapagos	0	0	0	0	0	0	0	0
Longfin Mako	16	21	14	10	19	36	7	8
Night	133	513	155	33	52	123	56	14
Sand Tiger	5	5	25	12	27	33	21	15
Whale	0	0	0	0	0	0	0	0
White	1	0	60	0	2	1	3	5
Atlantic Angel	21	65	57	37	23	31	67	52
Sevengill	0	1	1	5	4	1	0	1
Sixgill	0	0	0	112	0	0	0	4
Narrowtooth	0	0	0	0	0	0	0	0
Caribbean Sharpnose	0	0	0	0	0	0	0	0
Bigeye Sand Tiger	0	0	0	0	0	0	0	0
Bigeye Sixgill	9	2	6	5	0	0	0	0
Totals	1,829	1403	1071	497	1406	331	871	293

Table 1.4 Three-year average observed shark mortality (dead discards and kept in numbers of sharks) in the prohibited shark complex from 2008-2015.

	3 year averages						
Species	**2008-2010**	**2009-2011**	**2010-2012**	**2011-2013**	**2012-2014**	**2013-2015**	**Average**
Basking	7	15	21	21	26	24	19
Bigeye Thresher	48	40	32	30	31	33	36
Bignose	1	0	0	0	0	0	0
Caribbean Reef	5	6	176	176	175	1	90
Dusky	1,003	549	543	330	469	281	529
Galapagos	0	0	0	0	0	0	0
Longfin Mako	17	15	14	22	21	17	18
Night	267	234	80	69	77	64	132
Sand Tiger	12	14	21	24	27	23	20
Whale	0	0	0	0	0	0	0
White	20	20	21	1	2	3	11
Atlantic Angel	48	53	39	30	40	50	43
Sevengill	1	2	3	3	2	1	2
Sixgill	0	37	37	37	0	1	19
Narrowtooth	0	0	0	0	0	0	0
Caribbean Sharpnose	0	0	0	0	0	0	0
Bigeye Sand Tiger	0	0	0	0	0	0	0
Bigeye Sixgill	6	4	4	2	0	0	3
Totals	1,434	990	991	745	869	498	921

On an annual basis, NMFS will continue to monitor the prohibited shark complex, based on a comparison of the most recent three-year average mortality to previous three-year averages to evaluate the impact of conservation and management measures, and evaluate fishing mortality on the prohibited shark complex. NMFS anticipates that bycatch of dusky and other prohibited sharks will continue to occur; in other words, the three-year averages will be higher than zero. However, small amounts of bycatch are permissible where the ACL is set to zero and the bycatch is small and does not lead to overfishing. For the reasons discussed above, NMFS does not believe that further AMs are needed to prevent overfishing. If significant changes in the three-year average mortality occur, NMFS would evaluate trends in relative abundance data from species within the prohibited shark complex and evaluate current fisheries practices and look for patterns in bycatch mortality of species within the complex to determine if additional measures are needed to address overfishing.

In the case of dusky sharks, NMFS has determined that current bycatch levels result in overfishing. NMFS is proposing additional measures in Draft Amendment 5b to prevent overfishing of dusky sharks (see Chapter 2.0). These measures are in addition to previously-adopted shark management measures. NMFS considers these and other management measures for dusky sharks (e.g., prohibition on retention) to be AMs. After considering the proposed

revisions to the NS1 guidelines at 50 C.F.R. § 600.310(g)(3), NMFS does not believe additional AMs are needed for dusky sharks or other prohibited sharks. Over the past years, NMFS has taken significant regulatory action that has reduced fishing effort and mortality on shark species. Most significantly, Amendment 2 regulations dramatically changed how the directed shark fishery (which had frequent interactions with dusky sharks) operates by, among other things, reducing the commercial trip limit from 4,000 lb dw to 36 non-sandbar LCS per trip (approximately, 1,213 lb dw), significantly reducing the sandbar quota and prohibiting the retention of sandbar sharks outside a limited shark research fishery, and requiring that sharks be landed with their fins attached. Because dusky sharks have a similar distribution to sandbar sharks, and they were frequently caught together, measures that reduced sandbar shark catches also reduced dusky shark bycatch. To address bycatch of dusky sharks on bottom longline gear, the quota for sandbar sharks was reduced by 80 percent, leaving only a small, very closely monitored research fishery. Other measures to reduce dusky shark bycatch, which remain in place, included limiting the number of vessels authorized to land sandbar sharks and setting a finite number of trips that would be taken targeting sandbar sharks in the research fishery. Once this quota was met, there would be no more targeting or possession of sandbar sharks and other shark species within the shark research fishery. Implementing a more restrictive retention limit for non-sandbar LCS (e.g., 36 non-sandbar LCS/vessel/trip for directed permit holders) was also adopted to result in reduced fishing effort targeting sharks with BLL gear. NMFS also adopted measures that would not allow dusky sharks to be collected for public display, limiting the number of dusky sharks authorized for research, not allowing certain species of sharks that look like dusky sharks to be possessed in recreational fisheries, maintaining the mid-Atlantic shark closed area, and implementing additional time/area closures for BLL gear as recommended by the South Atlantic Fishery Management Council in its Amendment 14. These measures have already reduced effort and fishing mortality, which will increase the likelihood of rebuilding dusky sharks.

Additionally, Amendment 7 to the 2006 Consolidated HMS FMP in 2015 effected management measures in the pelagic longline fishery by implementing measures to control bluefin tuna bycatch in that fishery. As a result, pelagic longline fishery management and monitoring has changed significantly and, at least in the initial years of management under these controls, effort has decreased.

National Standard 1 and Determining the Rebuilding Timeframe

Under National Standard 1, if a stock is overfished, NMFS is required to "prepare an FMP, FMP amendment, or proposed regulations... to specify a time period for ending overfishing and rebuilding the stock or stock complex that will be as short as possible as described under section 304(e)(4) of the Magnuson- Stevens Act." (50 CFR 600.310(j)(2)(ii)). The time frame to rebuild the stock or stock complex must specify a time period that is as short as possible taking into account a number of factors including:

- The status and biology of the stock or stock complex;
- Interactions between the stock or stock complex and other components of the marine ecosystem;
- The needs of the fishing communities;

- Recommendations by international organizations in which the United States participates; and
- Management measures under an international agreement in which the United States participates.

The rebuilding target may not exceed ten years, unless dictated otherwise by:

- The biology of the stock or complex of fish;
- Other environmental conditions; or,
- Management measures under an international agreement in which the United States participates.

The lower limit of the specified time frame for rebuilding is determined by the status and biology of the stock and is defined as "…the amount of time the stock or stock complex is expected to take to rebuild to its MSY biomass level in the absence of any fishing mortality" (50 CFR 600.310 (j)(3)(i)(A)).

The National Standard 1 Guidelines specify two strategies for determining the rebuilding time frame depending on the lower limit of the specified time frame for rebuilding. The first strategy (50 CFR 600.310 (j)(3)(i)(C)) states that:

> "If T_{min} [minimum time for rebuilding a stock] for the stock or stock complex is 10 years or less, then the maximum time allowable for rebuilding (T_{max}) that stock to its B_{MSY} is 10 years."

The second strategy (50 CFR 600.310 (j)(3)(i)(D)), which is applicable for most species of sharks because the lower limit is generally 10 years or greater, specifies that:

> "If T_{min} for the stock or stock complex exceeds 10 years, then the maximum time allowable for rebuilding a stock or stock complex to its B_{MSY} is T_{min} plus the length of time associated with one generation time for that stock or stock complex. 'Generation time' is the average length of time between when an individual is born and the birth of its offspring."

The 1999 FMP established that management measures for Atlantic tunas, swordfish, and sharks should have at least a 50 percent chance of reaching the target reference points used in developing rebuilding projections. This target is consistent with the guidelines for National Standard 1. However, compared to other HMS and fish species, many shark species are slow growing, take a long time to mature, have few pups, and generally reproduce every two or three years (e.g., the dusky shark is believed to have a three-year reproductive cycle, two years for gestation and a one year resting period, with litters ranging from 3-12 pups). Due to these life history traits, many shark species have a low reproductive potential. Thus, as described in the 1999 FMP regarding sharks, NMFS typically uses a 70-percent probability to determine the rebuilding plan for sharks to ensure that the intended results are actually realized. The rebuilding timeframe for dusky sharks is calculated as part of the stock assessment process described below,

however, and considers the uncertainty associated with the stock assessment results and the appropriate probability level in light of that uncertainty.

2010/2011 (SEDAR 21) Stock Assessment and Rebuilding Timeframe for Dusky Sharks

The latest benchmark stock assessment for dusky sharks was completed through the Southeast Data, Assessment, and Review (SEDAR) 21 process in 2011 (76 FR 62331, October 7, 2011). The stock assessment provided an update to the 2006 dusky shark stock assessment. The SEDAR 21 stock assessment was the first assessment for dusky sharks conducted within the SEDAR process. Based on the 2006 assessment, dusky sharks were determined to be overfished and experiencing overfishing, and a rebuilding plan is currently in place for this species. The base model used for the SEDAR 21 assessment showed that dusky sharks were overfished (spawning stock biomass $[SSB]_{2009}/SSB_{MSY}$=0.44) and experiencing overfishing ($F2009/F_{MSY}$=1.59). In addition, 19 sensitivity analyses were performed during the assessment cycle. The Review Panel selected four sensitivity runs (described in detail in the assessment document) in addition to the base model to assess the underlying states of nature of the stock. Current biomass (i.e., SSB) values from these selected sensitivity runs all indicated that the stock was overfished (SSB_{2009}/SSB_{MSY}=0.41-0.50). In addition, current F values from the selected sensitivity runs indicated that the stock was experiencing overfishing (F_{2009}/F_{MSY}=1.39-4.35). Based on this, NMFS determined that dusky sharks was overfished and experiencing overfishing.

The 2006 assessment predicted that dusky sharks could rebuild within 100 to 400 years. Based on this, in Amendment 2, NMFS established a rebuilding year of 2108 (100 years from the date of implementation of Amendment 2). The rebuilding year determined from the base model in the SEDAR 21 assessment was similar to the rebuilding year established in Amendment 2. Specifically, SEDAR 21calculated as the year the stock would rebuild with no fishing pressure (i.e., F=0), or 2059, plus one generation time (the generation time for dusky sharks is 40 years) or 2099. The target year for rebuilding ranged from 2081 to 2257 depending on the state of nature (i.e., sensitivity run) of the stock. The base model indicated that the 2009 fishing mortality (F_{2009}=0.06) would have to be reduced by more than half (to F=0.02) in order to have a 70 percent probability of rebuilding by 2099. The base model also estimated that, with the 2009 fishing mortality rate, there was a low probability (11 percent) of stock recovery by 2408 (or 400 years).

2012/2013 Petitions to List Dusky Sharks Under the Endangered Species Act (ESA)

On November 14, 2012, NMFS received a petition from WildEarth Guardians to list the dusky shark as threatened or endangered under the Endangered Species Act (ESA) throughout its entire range, or, as an alternative, to list the Northwest Atlantic/Gulf of Mexico distinct population segment (DPS) as threatened or endangered. The petitioners also requested that critical habitat be designated for the dusky shark under the ESA. On February 1, 2013, NMFS received a petition from Natural Resources Defense Council to list the northwest Atlantic DPS of dusky shark as threatened, or, as an alternative, to list the dusky shark range-wide as threatened, and a request that critical habitat be designated. On May 17, 2013 (78 FR 29100), NMFS announced a 90-day finding that the petitions presented substantial scientific or commercial information indicating that the petitioned action may be warranted for the Northwest Atlantic and Gulf of

Mexico population of dusky shark. This finding initiated a status review of the Northwest Atlantic and Gulf of Mexico population of dusky shark to determine if the petitioned action was warranted.

NMFS completed its status review in October 2014 and contained updated analyses of data sources that were used in the SEDAR 21 stock assessment. Specifically, updated analyses of three fishery-independent surveys, the Northeast Fishery Science Center (NEFSC) Coastal Shark Bottom Longline Survey (NELL), the Virginia Institute of Marine Science Shark Longline Survey (VIMS LL), and the University of North Carolina Shark Longline Survey (UNC LL), were conducted using the same methodology, delta-lognormal generalized linear mixed modeling, as reported during the SEDAR 21 Data Workshop (McCandless et al., 2014). The updated analyses included data from 2010 – 2012 and showed an increasing trend in dusky shark indices of abundance for all three surveys since 2009, the terminal year of data used in the SEDAR 21 stock assessment (Figure 1.2, McCandless et al., 2014).

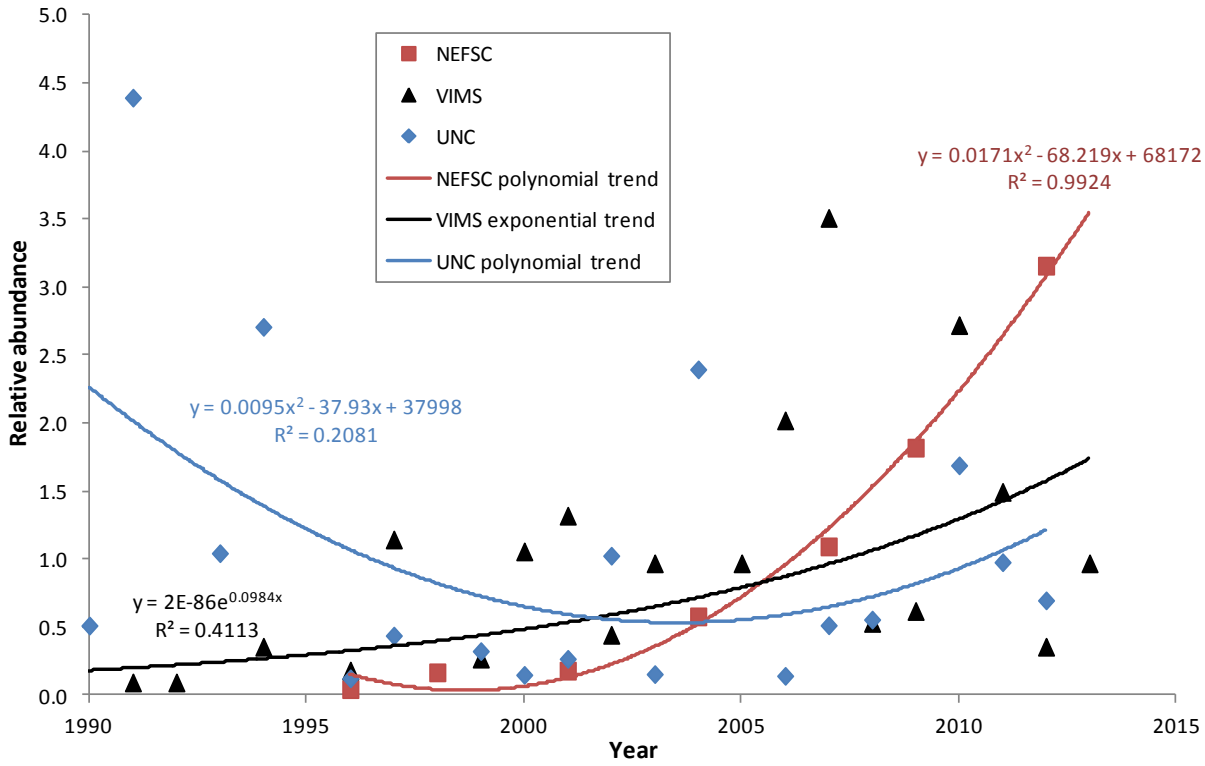

Figure 1.2 Dusky shark indices of abundance (index/mean) standardized using a delta-lognormal generalized linear mixed model plotted by year for three fishery-independent time series. NEFSC = Northeast Fisheries Science Center Coastal Shark Bottom Longline Survey, VIMS = Virginia Institute of Marine Science Shark Longline Survey, and UNC = University of North Carolina Shark Longline Survey. Trend lines are best fit regression models of the standardized data (exponential for VIMS and second order polynomial for NEFSC and UNC).

After reviewing these trends and other relevant data, the Status Review Team concluded that based on the most recent stock assessment, abundance projections, updated analyses, and the

potential threats and risks to population extinction, that the dusky shark population in the Northwest Atlantic and Gulf of Mexico has a low risk of extinction currently and in the foreseeable future. On December 12, 2014 (79 FR 74954), NMFS announced a 12-month finding that determined that the Northwest Atlantic and Gulf of Mexico population of dusky sharks did not warrant listing under the ESA.

2016 SEDAR 21 Dusky Shark Stock Assessment Update

In 2015, there were indicators that management actions may already have reduced dusky shark mortality to levels prescribed by the SEDAR 21 stock assessment; namely, estimated reductions in dusky shark mortality since 2009 and the increasing population trends from fishery-independent surveys presented in the ESA status review. In light of these indicators and new information, the Southeast Fisheries Science Center (SEFSC) prioritized an update of the SEDAR 21 dusky shark stock assessment using data through 2015.

An update to the SEDAR 21 benchmark stock assessment for dusky shark was initially released by the NMFS Southeast Fisheries Science Center in July 2016 (SEDAR 2016a and 2016b), and, consistent with the SEDAR process[3], underwent an internal NOAA peer review during August 2016. Under the SEDAR process, updates only allow for applying additional years of data to an existing assessment. No workshops are convened; instead the lead analytical scientist obtains the recent information and updates the analytical model accordingly. The dusky shark assessment update used the same methods (an Age-Structured Catch-Free Model), input data series, parameters, and assumptions that were accepted during SEDAR 21 in 2010/2011 (described above). The assessment update added 2010-2015 data inputs (fishery-dependent and –independent data, relative effort series, etc.) to the accepted models in order to update the status of the stock using the most recent data. There were five model scenarios that were run (the same five models used in SEDAR 21), all of which were considered to be plausible states of nature according to SEDAR 21 (i.e., no single model is considered preferred over the others). The draft and final reports along with the peer review reports are available on the SEDAR website (http://sedarweb.org/sedar-21).

Despite including much of the same data as those used in the 2014 ESA Dusky Shark Status Review Report (McCandless et al., 2014), which suggested mostly positive trends in dusky shark relative abundance, the 2016 assessment update concluded that the stock is still overfished and experiencing overfishing, although the level of overfishing has decreased compared to previous assessments and is low (Figure 1.3). Specifically, spawning stock fecundity (SSF) relative to SSF_{MSY} (proxy biomass target) ranges from 0.41 to 0.64 (i.e., overfished) (median = 0.53). The fishing mortality rate (F) in 2015 relative to F_{MSY} is estimated to be 1.08-2.92 (median = 1.18) (values >1 indicate overfishing). The estimates for each model are listed in Table 1.5. The peer

3 Under the October 2015 SEDAR Guidelines (http://sedarweb.org/docs/page/SEDARPoliciesandProcedures_Oct15_FINAL_update.pdf), "the peer review stage of the update approach is provided by the [Scientific Statistical Committee (SSC)] or Cooperator equivalent." Because the HMS Management Division does not have an SSC, NMFS arranged for two scientists in the NEFSC and AKSC who were not involved in either the update or SEDAR 21 to provide a peer review of the draft update. Once the peer review was complete, the lead scientist in the SEFSC updated the assessment as needed.

reviewers did not identify any issues or concerns with the methods applied or the results or conclusions of the assessment update. However, SEDAR 21 and the 2016 update noted a high level of uncertainty in the input observations, as well as the model outputs, beyond that of many other Atlantic shark stock assessments.

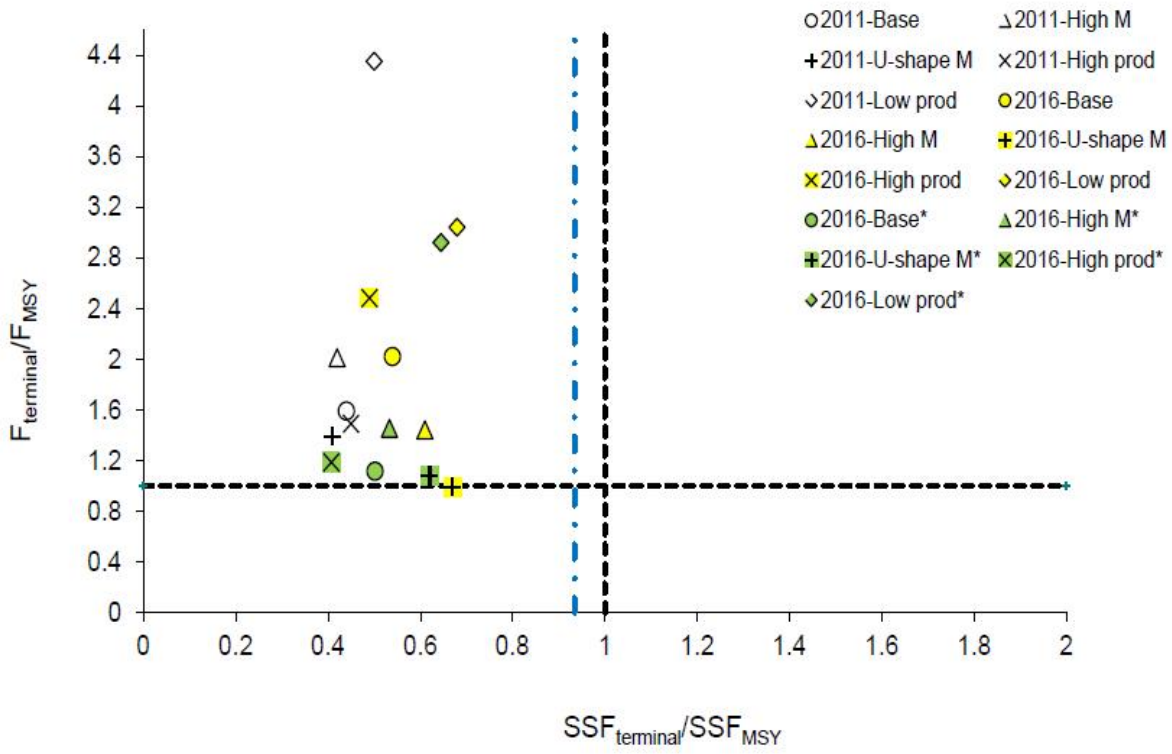

Figure 1.3 Phase plot summarizing stock status of dusky sharks across the 5 model scenarios (shapes) and between the 2010/2011 SEDAR 21 assessment (open symbols, terminal year of the assessment was 2009), the preliminary 2016 assessment update (yellow symbols, terminal year of the assessment was 2015), and the final 2016 assessment update (green symbols). The details of each model scenario are described in the SEDAR 21 documents.

The time series of relative abundance used in the model runs (Figure 1.4) show varying trends in dusky shark abundance. The Northeast Fisheries Science Center Longline Survey (NELL) has shown a near linear increase in abundance over time. The Bottom Longline Observer Program (BLLOP) relative abundance time series is variable, but increasing. The Large Pelagics Survey (LPS) recreational fishery index has been relatively stable in recent years. However, the Virginia Institute of Marine Science (VIMS) Longline survey and Pelagic Longline Observer Program (PLLOP) time series all show declines in relative abundance of dusky sharks in the most recent years. While there are questions on why these trends are different from each other, and some concerns regarding how well each time series reflects natural abundance of dusky sharks, these data series were accepted for use by SEDAR 21 and could not be changed for the 2016 assessment update. All of the available data sources, time series, parameters, and assumptions will be re-evaluated through the next benchmark assessment for dusky sharks (not currently scheduled).

Table 1.5 Summary of projection results for the five scenarios in the 2016 SEDAR 21 dusky shark assessment update. F = fishing mortality rate, MSY = maximum sustainable yield, SSF = spawning stock fecundity (a biomass proxy), P50 = 50% probability, P70 = 70% probability, TAC = total allowable catch, $Year_{rebuild}$ = estimated rebuilding year.

	Terminal conditions					*F*-$Year_{rebuild}$		TAC-$Year_{rebuild}$ (lb dressed weight)	
Scenario	F_{2015}	F_{2015}/F_{MSY}	SSF_{2015}/SSF_{MSY}	YearF=0p70	$Year_{rebuild}$	P50	P70	P50	P70
Base	0.028	1.12	0.50	2053	2093	0.020	0.017	32413	24188
High *M*	0.017	1.45	0.53	2097	2137	0.007	0.004	18984	10956
U-shaped *M*	0.017	1.08	0.62	2067	2107	0.011	0.008	27346	17711
High Prod	0.046	1.18	0.41	2044	2084	0.035	0.032	47400	36101
Low Prod	0.015	2.92	0.64	2164	2204	0.003	0.001	7117	3507

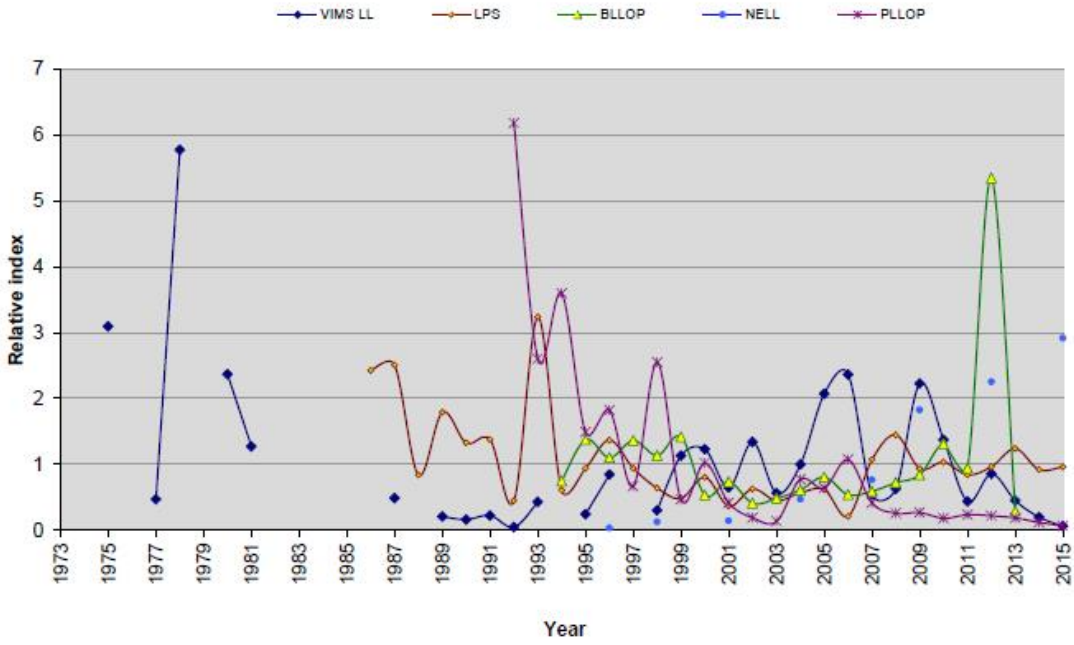

Figure 1.4 Fishery-dependent and –independent time series of dusky shark relative abundance included in the preliminary 2016 SEDAR 21 assessment update. VIMS LL = Virginia Institute of Marine Science Longline Survey; LPS = Large Pelagics Survey; BLLOP = Bottom Longline Observer Program; NELL = Northeast Fisheries Science Center Longline Survey; and PLLOP = Pelagic Longline Observer Program. The BLLOP time series was updated in the final addendum to the assessment update.

The rebuilding year was also updated according to the new model projections. The target rebuilding year was calculated as the amount of time needed for the stock to reach the target (SSF_{MSY}) with a 70 percent probability in the absence of fishing mortality (F=0) plus one mean

generation time (40 years). The updated projections estimate that the target rebuilding years range from 2084-2204, with a median of 2107. The previous rebuilding year under SEDAR 21 was 2108.
In order to achieve rebuilding by 2107 with a 50 percent probability, the final models projected that F on the stock would have to be reduced 24-80 percent (median = 35 percent) from 2015 levels. The assessment update states that the stock can sustain small amounts of fishing mortality during its rebuilding. When developing measures to address overfishing or rebuilding in HMS fisheries, NMFS' general approach is that measures should have at least a 50-percent probability of success in achieving those goals. For Atlantic highly migratory sharks, however, NMFS has, since 1999, typically used a 70-percent probability for sharks, in light of their late age to maturity, reproduction, population growth rate, and other considerations. Given particular issues specific to the 2016 SEDAR 21 dusky shark assessment update (explained below), NMFS used the F reduction associated with the 50-percent probability to develop Draft Amendment 5b.

Data on dusky sharks is limited, given the retention prohibition and fact that interactions with prohibited sharks are rare events, and dusky shark sharks are often misidentified. Data input to the models came from different types of fishing vessels/gears and time series collected by different entities, including the Atlantic Shark Bottom Longline Observer Program, Shark Bottom Longline Research Fishery, the Atlantic Pelagic Observer Program, the recreational Large Pelagics Survey, the Northeast Fisheries Science Center's Bottom Longline Survey, and the Virginia Institute of Marine Science's Bottom Longline Survey. Based on these data, the five plausible model scenarios in the 2016 assessment update produced a very wide range of estimates (overfishing and overfished status) and outcomes (F reductions, rebuilding timelines, etc.). In light of the range of estimates and outcomes, NMFS used the median of the five scenarios in its development of measures in Draft Amendment 5b to address overfishing and rebuilding of dusky sharks. Given the range of plausible scenarios from the assessment update, using the median of multiple scenarios is an acceptable method because it is an objective approach for reconciling a range of management options. It is also consistent with the management approach to similar situations in other fisheries (e.g., New England Fishery Management Council's Scientific and Statistical Committee's recommendation for yellowtail flounder in September 2009; Scott et al. 2016).

Because of the above issues, NMFS decided it was appropriate from a scientific, technical perspective to use the F reduction associated with the 50-percent probability when developing Draft Amendment 5b. While NMFS typically uses a 70-percent probability for Atlantic highly migratory shark species, the 2016 update has a higher level of uncertainty than other shark assessments and presents a more pessimistic view of stock status than was expected based on our preliminary review of the same information and other available information. Such information includes the information reviewed in the ESA Status Review, reductions in U.S. fleet fishing effort due to management actions, and updated age and growth information indicating that dusky sharks are more productive than previously thought (Natanson et al. 2014). This information could not be used in the 2016 assessment update, because assessment updates only incorporate data inputs (e.g., time series, life history parameters, etc.) that were previously vetted through the SEDAR process and approved as part of the most recent benchmark assessment. Here, that was the 2011 benchmark stock assessment (SEDAR 21). Based on its review of the 2016 update, understanding about the operation of the HMS fisheries under current management measures,

and other available information, the F estimate associated with the 50-percent probability more accurately reflects current fishing pressure and accounts for the new information on dusky shark productivity than the F estimate associated with the 70-percent probability. From a statistical perspective, the wider confidence band in the projections results in the F estimate associated with a 70-percent probability being substantially lower than the apical value. Thus, the F reduction associated with 70-percent goes well beyond what we would consider appropriately precautionary even for species with relatively slow life history such as sharks (Figure 1.5). NMFS also notes that the rebuilding year (i.e., length of time the species could rebuild with no fishing mortality plus one mean generation time) was calculated using a 70-percent probability, as is typically done in assessments, which additionally increases the likelihood of achieving rebuilding within the mandated time period.

Therefore, based on the 2016 assessment update, NMFS needs to reduce dusky shark fishing mortality by approximately 35 percent relative to 2015 levels to rebuild the stock by the year 2107. NMFS also needs to address overfishing, but the level of overfishing is not high (median F_{2015}/F_{MSY} is 1.18). This approach is supported by the evidence described above, and is sufficiently precautionary under the circumstances.

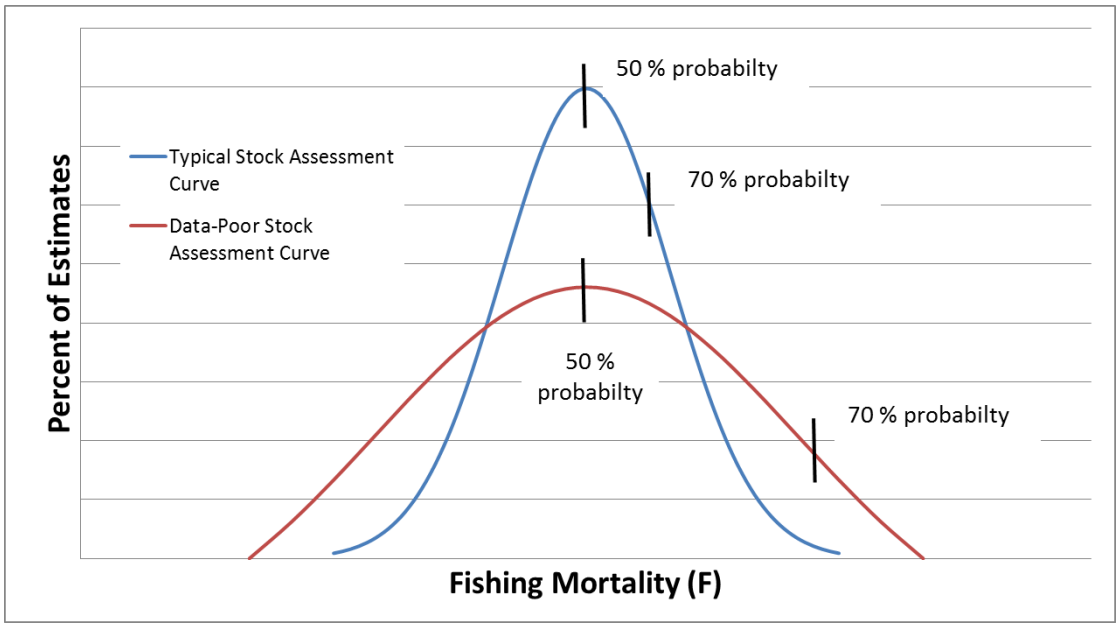

Figure 1.5 Example of "normal" and "data-poor" fishing mortality distribution curves.

1.3 Social and Economic Concerns

To satisfy the mandates of subsections 303(a)(9), 301(a)(8), and 304(g)(1)(C) of the Magnuson-Stevens Act and the requirements under National Environmental Policy Act, this document identifies and evaluates the direct, indirect, and cumulative impacts of the proposed action on the social and economic elements of the human environment. These subsections are summarized below and are outlined in greater detail in Chapters 4.0 through 7.0.

The Magnuson-Stevens Act subsection 303(a)(9) requires any FMP to include a fishery impact statement which shall assess, specify, and analyze the likely effects, if any, including the cumulative conservation, economic, and social impacts, of the conservation and management measures on, and possible mitigation measures for:

- Participants in the fisheries and fishing communities affected by the plan or amendment;
- Participants in the fisheries conducted in adjacent areas under the authority of another Council, after consultation with such Council and representatives of those participants; and,
- The safety of human life at sea, including whether and to what extent such measure may affect the safety of participants in the fishery.

A similar analysis using much of the same economic and social data is included to ensure consistency with the Magnuson-Stevens Act National Standard 8 (MSA sec. 301(a)(8),), which requires that conservation and management measures, including those developed to end overfishing and rebuild fisheries:

- Take into account the importance of fishery resources to fishing communities in order to provide for their sustained participation; and,
- To the extent practicable, minimize the adverse economic impacts on such communities.

Additionally, paragraph 304(g)(1)(C) requires the Secretary to:

- Evaluate the likely effects, if any, of conservation and management measures on participants in the affected fisheries; and,
- Minimize, to the extent practicable, any disadvantage to U.S. fishermen in relation to foreign competitors.

1.4 Scope and Organization of this Document

In considering the proposed management measures outlined in this document, NMFS is responsible for complying with a number of Federal statutes, including NEPA. Under NEPA, the purpose of an EIS is to provide an environmental analysis to support the Secretary's regulatory decision and to encourage and facilitate involvement by the public in the environmental review process.

This EIS assesses potential impacts on the biological and human environments associated with the establishment under Federal regulation of various management measures for the recreational and commercial fisheries that interact with dusky sharks.

In developing this document, NMFS adhered to the procedural requirements of NEPA; the Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 Code of Federal Regulations (CFR) 1500-1508) 28, and NOAA's procedures for implementing NEPA. NOAA Administrative Order (NAO) 216-6 identifies NOAA's procedures to meet the requirements of NEPA to:

- Fully integrate NEPA into the agency planning and decision making process; fully consider the impacts of NOAA's proposed actions on the quality of the human environment;

- Involve interested and affected agencies, governments, organizations and individuals early in the agency planning and decision making process when significant impacts are or may be expected to the quality of the human environment from implementation of proposed major Federal actions; and

- Conduct and document environmental reviews and related decisions appropriately and efficiently.

The following definitions were generally used to characterize the nature of the various impacts evaluated with this EIS.

- Short-term or long-term impacts. These characteristics are determined on a case-by-case basis and do not refer to any rigid time period. In general, short-term impacts are those that would occur only with respect to a particular activity or for a finite period. Long-term impacts are those that are more likely to be persistent and chronic.

- Direct or indirect impacts. A direct impact is caused by a proposed action and occurs contemporaneously at or near the location of the action. An indirect impact is caused by a proposed action and might occur later in time or be farther removed in distance but still be a reasonably foreseeable outcome of the action. For example, a direct impact of erosion on a stream might include sediment-laden waters in the vicinity of the action, whereas an indirect impact of the same erosion might lead to lack of spawning and result in lowered reproduction rates of indigenous fish downstream.

- Minor, moderate, or major impacts. These relative terms are used to characterize the magnitude of an impact. Minor impacts are generally those that might be perceptible but, in their context, are not amenable to measurement because of their relatively minor character. Moderate impacts are those that are more perceptible and, typically, more amenable to quantification or measurement. Major impacts are those that, in their context and due to their intensity (severity), have the potential to meet the thresholds for significance set forth in CEQ regulations (40 CFR 1508.27) and, thus, warrant heightened attention and examination for potential means for mitigation to fulfill the requirements of NEPA.

- Adverse or beneficial impacts. An adverse impact is one having adverse, unfavorable, or undesirable outcomes on the man-made or natural environment. A beneficial impact is one having positive outcomes on the man-made or natural environment. A single act might result in adverse impacts on one environmental resource and beneficial impacts on another resource.

- Cumulative impacts. CEQ regulations implementing NEPA define cumulative impacts as the "impacts on the environment which result from the incremental impact of the

action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions." (40 CFR 1508.7) Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time within a geographic area.

In addition to NEPA, NMFS must comply with other Federal statutes and requirements such as the Magnuson-Stevens Act, Executive Order 12866, and the Regulatory Flexibility Act. This document comprehensively analyzes the alternatives considered for all these requirements. Chapters 4.0, 6.0, and 7.0 provide the economic analyses; Chapter 6.0 meets the requirements under Executive Order 12866; Chapter 7.0 provides the Initial Regulatory Flexibility Analysis required under the Regulatory Flexibility Act; Chapters 8.0 and 9.0 also provide additional information that is required under various statutes. While some of the chapters were written in a way to comply with the specific requirements under these various statutes and requirements, it is the document as a whole that meets these requirements and not any individual chapter.

1.5 Purpose, Need, and Objectives

The purpose of Amendment 5b is to develop and implement management measures that would end overfishing of dusky sharks and rebuild the dusky shark stock in conformance with applicable requirements under the Magnuson-Stevens Act to rebuild overfished stocks and end overfishing. As stated above in Section 1.2, alternatives to address the overfished/overfishing occurring status of the dusky shark stock were proposed in the Amendment 5 DEIS and proposed rule. However, after substantive public comment on that DEIS and proposed rule, NMFS decided that further analyses were needed for dusky shark measures, and that the further analyses would be conducted in a separate proposed rule and EIS. The purpose and need of Amendment 5b is as follows:

Purpose: The purpose of the proposed measures is to manage fishery resources in a manner that maximizes resource sustainability, while minimizing, to the greatest extent possible, the socioeconomic impacts on affected fisheries.

Need: To achieve this purpose, NMFS needs to implement management measures to rebuild the dusky shark stock and end overfishing on the dusky shark stock. More specifically, NMFS has identified the following objectives with regard to this proposed action:

- End overfishing on dusky sharks;
- Make any necessary modifications to the rebuilding plan for dusky sharks to ensure that fishing mortality levels on dusky sharks are maintained at or below levels that would result in rebuilding in the timeframe recommended by the assessment update
- Clarify ACLs and implement preventative AMs for the prohibited shark species complex

Specifically, based upon the results of the 2016 SEDAR 21 dusky shark assessment update, NMFS aims to achieve a 35 percent mortality reduction relative to 2015 levels, and rebuild the dusky shark stock by the year 2107.

1.6 Public Comment and Review

The final rule for Amendment 5a did not contain any dusky shark-specific management measures, and thus, did not address public comments received on the draft Amendment 5 (DEIS and proposed rule) regarding management measures specifically designed to end overfishing on and rebuild dusky sharks. The dusky shark comments received on Draft Amendment 5 were considered in the development of dusky shark-specific potential alternatives contained in the Amendment 5b Predraft. Those potential alternatives represented the range of alternatives considered reasonable, based on screening criteria outlined in Chapter 2 of the Predraft, that would achieve the purpose and need of Amendment 5b, and address public comments pertaining to dusky shark management measures received on the proposed rule for Draft Amendment 5. Comments received on the Predraft from the public and the HMS Advisory Panel, along with comments on Draft Amendment 5, were considered in the development of the alternatives in this DEIS. The range of alternatives in this EIS is considered reasonable, based on screening criteria outlined in Chapter 2.0, and would achieve the purpose and need of Amendment 5b.

Not every public comment on Draft Amendment 5 related to dusky shark management was developed into an alternative contained in the Amendment 5 Predraft. Rather, in the Amendment 5b Predraft, NMFS considered all of the comments on Draft Amendment 5 to create a range of reasonable alternatives, based on defined screening criteria, to develop potential alternatives that would meet the purpose and need of Amendment 5b. NMFS then presented the alternatives in the Amendment 5b Predraft at the 2014 Spring HMS Advisory Panel meeting and made the Amendment 5b Predraft available online for public comment. NMFS also presented a new analysis of dusky shark mortality data at the September 2015 HMS Advisory Panel meeting. NMFS then received the dusky shark assessment update, and considered the comments from the HMS Advisory Panel and public on the alternatives in the Amendment 5b Predraft and the updated data analysis to create a range of reasonable alternatives to address the issues identified in the assessment update, based on screening criteria defined in Chapter 2.0, to develop potential alternatives that would meet the purpose and need of Amendment 5b.

Therefore, the alternatives proposed in this document have considered all of the public comments on Draft Amendment 5, the Amendment 5b Predraft, and the updated data analysis presented at the September 2015 Advisory Panel Meeting. The differences between the structure of the alternatives that focused on dusky sharks in Draft Amendment 5 and the alternatives that were developed in the Amendment 5b Predraft, and the rationale behind their development, were discussed in Section 1.5 of the Amendment 5b Predraft. The Amendment 5b Predraft organized alternatives as individual, stand-alone alternatives, because the grouping of alternatives in alternative suites, which was done in Draft Amendment 5 to clarify the overlapping impacts on multiple shark stocks that were being addressed, is not necessary for alternatives developed specifically for dusky sharks. The Predraft organized individual, stand-alone alternatives for dusky sharks and grouped them into two categories, recreational and commercial, for ease of understanding which management measures would impact each fishery. This is the same

organizational format that is used in this DEIS, because the alternatives in the DEIS only address dusky sharks.

1.7 References

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2.0 Summary of the Alternatives

NEPA requires that any Federal agency proposing a major federal action consider all reasonable alternatives, in addition to the proposed action. The evaluation of alternatives in an EIS assists NMFS in ensuring that any unnecessary impacts are avoided through an assessment of alternative ways to achieve the underlying purpose of the project that may result in less environmental harm.

To warrant detailed evaluation, an alternative must be reasonable[4] and meet the purpose and need of the action (see Chapter 1.0). Screening criteria are used to determine whether an alternative is reasonable. The following discussion identifies the screening criteria used in this EIS to evaluate whether an alternative is reasonable; evaluates various alternatives against the screening criteria (including the proposed measures) and identifies those alternatives found to be reasonable; identifies those alternatives found not to be reasonable; and for the latter, the basis for this finding.

Screening Criteria – To be considered "reasonable" for purposes of this EIS, an alternative must be designed to meet the purpose and need for action described in Chapter 1.0 and meet the following criteria:

- *An alternative must be consistent with the 10 National Standards set forth in the Magnuson-Stevens Act*
- *An alternative must be administratively feasible. The costs associated with implementing an alternative cannot be prohibitively exorbitant or require unattainable infrastructure.*
- *An alternative cannot violate other laws (e.g., Endangered Species Act, Marine Mammal Protection Act, etc.).*
- *An alternative must be consistent with the 2006 Consolidated Atlantic HMS FMP and its amendments.*
- *An alternative must be consistent with the Terms and Conditions of the 2012 Shark Biological Opinion (BiOp) and the Terms and Conditions and Reasonable and Prudent Alternatives of the 2004 PLL BiOp.*

This chapter includes a full range of reasonable alternatives designed to meet the purpose and need for action described in Chapter 1.0. The environmental, economic, and social impacts of these alternatives are discussed in later chapters.

The 2016 SEDAR 21 stock assessment update indicated that the dusky shark stock is overfished and that overfishing is still occurring. This EIS includes a wide range of alternatives and prefers a set of alternatives that will achieve the objectives of Amendment 5b, primarily ending

4 "Section 1502.14 (of NEPA) requires the EIS to examine all reasonable alternatives to the proposal. In determining the scope of alternatives to be considered, the emphasis is on what is "reasonable" rather than on whether the proponent or applicant likes or is itself capable of carrying out a particular alternative. Reasonable alternatives include those that are practical or feasible from the technical and economic standpoint and using common sense, rather than simply desirable from the standpoint of the applicant." (CEQ, "NEPA's Forty Most Asked Questions" (available at http://ceq.hss.doe.gov/nepa/regs/40/40P1.HTM) (emphasis added))

overfishing and rebuilding the dusky shark stock. A number of alternatives that were considered and/or commented on during the development of this action are not preferred alternatives at this time, because they are not needed to meet the objectives of the amendment and would result in negative economic impacts, would not meet the objectives of the amendment, would not be logistically/administratively feasible, are not scientifically supportable, and/or they would result in other unnecessary, negative impacts. As explained above, NMFS has already taken significant actions that reduce fishing effort and mortality. After extensive review of available management measures, NMFS has determined that the preferred alternatives in conjunction with the existing management measures will achieve the needed reductions and thus will prevent overfishing and rebuild dusky sharks. However, we specifically request comment from the public on other potential management measures and any scientific, policy, or other support for them. In response to public comment, NMFS may make changes in Final Amendment 5b by modifying the proposed measures or adopting different or additional or new measures to meet the same purpose and need.

Recreational Alternatives

This EIS contains for consideration 9 recreational management alternatives (including 3 sub-alternatives), which cover the scope of reasonable alternatives that could meet the purpose and need of Amendment 5b. They include reasonable alternatives that were similar in approach to those included in Draft Amendment 5, as well as alternative management measures to reduce dusky shark mortality in the recreational and commercial fisheries.

Section 1.5 of the Amendment 5b Predraft describes alternatives that considered public comment and were modified from what was proposed in Draft Amendment 5, such as establishing a new recreational minimum size for non-hammerhead sharks. The Amendment 5b Predraft also included new alternatives that were created considering public comment on Draft Amendment 5.

Commercial Alternatives

This EIS contains for consideration 18 commercial management alternatives (including 10 sub-alternatives), which cover the scope of reasonable alternatives that could meet the purpose and need of Amendment 5b. They include reasonable alternatives that were similar in approach to those included in Draft Amendment 5, as well as alternative management measures to reduce dusky shark mortality in the commercial pelagic longline fishery that were not considered in Draft Amendment 5 in response to public comments.

Section 1.5 of the Amendment 5b Predraft describes the alternatives that were developed considering public comment on the commercial measures included in Draft Amendment 5. These alternatives included a number of new approaches (e.g., hook limits, use of weak hooks, fleet communication protocol), and some approaches that were similar or slightly modified (e.g., hotspot closure areas, changing the end date of a state water shark closure) from the alternatives that were included in Draft Amendment 5. Some of these alternatives have been included in this EIS, and some have been modified after considering public comment on the Amendment 5b Predraft, HMS AP comments, and other more recent information. NMFS may make changes in

Final Amendment 5b by modifying the proposed measures or adopting different or additional or new measures to meet the same purpose and need.

2.1 Recreational Alternatives

NMFS is analyzing a range of alternatives in the recreational fisheries. In response to public comment, NMFS may make changes in Final Amendment 5b by modifying the preferred measures, selecting different alternatives, or additional or new measures, to meet the same purpose and need in the recreational fisheries.

Alternative A1 — No Action. Do not implement management measures to end overfishing and rebuild dusky sharks in the Atlantic recreational shark fishery.

This alternative would not implement any management measures in the recreational shark fishery to decrease mortality of dusky sharks. Under Alternative A1, recreational measures for sharks would remain the same with no bag or size limit for smoothhound sharks, a bag limit of one shark (any authorized species) greater than 54 inches fork length or one hammerhead shark (great, scalloped, or smooth) greater than 78 inches fork length per vessel per trip, and one Atlantic sharpnose and bonnethead shark per person per trip with no minimum size.

Alternative A2 — *Require HMS permit holders fishing for sharks recreationally to obtain a shark endorsement, which requires completion of an online shark identification and fishing regulation training course, in order to retain sharks.* – Preferred Alternative

Under Alternative A2, HMS permit holders that recreationally fish for, retain, possess, or land sharks to obtain a "shark endorsement," which would require completing an online shark identification and fishing regulation training course, before they will be permitted to fish for, retain, possess, or land sharks. This would include HMS Angling and Charter/Headboat permit holders, as well as General category and Swordfish General Commercial permit holders when participating in a registered HMS fishing tournament. Obtaining the shark endorsement would be included in the annual HMS Angling, Charter/Headboat, Atlantic tunas General category, and Swordfish General Commercial permit application or annual renewal process and would not result in any additional fees beyond the cost of the permit itself. Unlike changing permit categories (which can only be done within 45 calendar days of the date of issuance of the permit), vessel owners could obtain a shark endorsement, which would be added to their relevant permit, throughout the year. An online quiz, administered during the application or renewal process, would be required in order to obtain the shark endorsement. This online quiz would focus on identification of prohibited species (e.g., dusky sharks), current recreational rules and regulations, and safe handling instructions.

Currently, retention of dusky sharks is prohibited in the recreational fishery. Mortality or landings in the recreational fishery, then, is likely a result of either species misidentification or a lack of knowledge about prohibited shark species regulations or safe handling to minimize harm to accidentally caught fish. The application process for the shark endorsement would also provide an opportunity for focused outreach, and the list of shark endorsement holders would

allow for more targeted surveys, increasing the reliability of recreational shark catch estimates. As a result of this measure, NMFS expects accidental retention of dusky sharks to decrease and for dusky shark fishing mortality to decrease in recreational fisheries.

Only recreational anglers fishing from a vessel that has been issued a shark endorsement on a valid permit would be able to retain authorized shark species, consistent with minimum sizes, bag limits, and, if applicable, the gear requirements considered in Alternative 6 below. No other recreational fishermen would be able to retain sharks in federal waters.

This alternative also includes the development of a coordinated outreach, education, and enforcement campaign to reduce dusky shark mortality (through safe handling and release methods), improving regulatory compliance on prohibited species, and improving species identification and monitoring of catches in the recreational fishery. NMFS would work with fishery management partners such as the Atlantic and Gulf States Marine Fisheries Commissions as well as coastal states as part of the coordinated outreach campaign.

Alternative A3 — Require HMS permit holders fishing for sharks recreationally to have a NMFS-approved shark identification placard onboard when fishing for and/or retaining sharks.

This alternative would require participants in the recreational shark fishery to carry a NMFS-approved shark identification placard on board the vessel when fishing for sharks. This requirement primarily would apply to HMS Angling and Charter/Headboat permit holders since they are the most likely to intend to recreationally fish for, retain, posses, or land sharks. However, this requirement would also apply to Atlantic tunas General category and Swordfish General Commercial permit holders when participating in registered HMS fishing tournaments and recreationally fishing for sharks. Only recreational anglers fishing from a vessel that has a NMFS-approved shark identification placard on board would be able to fish for and/or retain authorized shark species, consistent with minimum size and bag limits. No other recreational fishermen would be able to fish for sharks as a condition of their permit.

Alternative A4 — Prohibit retention of all ridgeback sharks, including oceanic whitetip, tiger, and smoothhound sharks, in the Atlantic recreational shark fishery.

Federally permitted recreational fishermen are currently prohibited from retaining all ridgeback sharks (including dusky sharks) except for oceanic whitetip, tiger, and smoothhound sharks, under certain conditions. Under Alternative A4, the prohibition on retention of ridgeback sharks would be extended to include oceanic whitetip, tiger and smoothhound sharks. Most commonly, this requirement would apply to HMS Angling and Charter/Headboat permit holders since they are the most likely to be fishing recreationally. However, this requirement would also apply to Atlantic tunas General category and Swordfish General Commercial permit holders participating in registered HMS fishing tournaments and recreationally fishing for sharks. "Ridgeback sharks" are those sharks that have an "interdorsal ridge." An interdorsal ridge is a visible line of raised skin between the first and second dorsal fins and is a prominent visible characteristic (Figure 2.1). Sandbar, silky, and dusky sharks are all ridgeback sharks, as are oceanic whitetip, tiger, and smoothhound sharks. Blacktip, spinner, sharpnose, and bonnethead sharks are not ridgeback sharks.

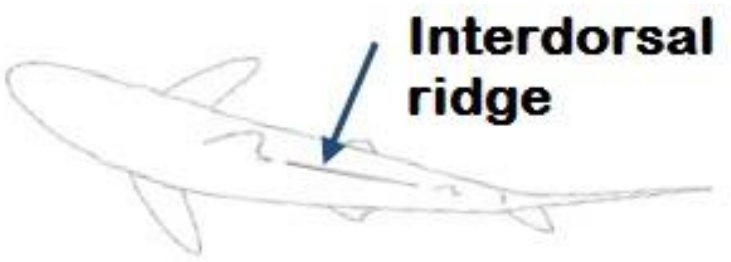

Figure 2.1 Diagram of a shark with an interdorsal ridge.

Alternative A5 Increase the recreational minimum size to 89 inches fork length for all sharks.

The current recreational size limit of 54 inches fork length was originally adopted under the 1999 FMP for Atlantic Tunas, Swordfish and Sharks to reduce the effective fishing mortality on the most sensitive life stages of sandbar sharks (i.e., juveniles and sub-adults). Under Alternative A5, the minimum recreational size limit for authorized sharks, except for smoothhound, Atlantic sharpnose, bonnethead, and hammerhead (great, scalloped, and smooth) sharks, would be increased from 54 to 89 inches fork length based on the best available scientific data specific to dusky sharks. Natanson et al. (2014) reported that female dusky sharks reach sexual maturity at 227 cm fork length (approximately 89 inches).

This is not a preferred alternative at this time, but if it were to become preferred, NMFS would consider comments received on this measure on the Amendment 5 proposed rule, including potential exemptions for easily identifiable shark species (e.g., blacktip sharks, thresher sharks, etc.).

A6 Alternatives Recreational Circle Hook Alternatives

NMFS has developed three circle hook sub-alternatives to reduce dusky shark mortality in the recreational shark fisheries, one of which (Alternative A6a) is preferred at this time.

Alternative A6a *Require the use of circle hooks by all HMS permit holders with a shark endorsement when fishing for sharks recreationally (and when deploying natural bait while using a wire or heavy (200 lb test or greater) monofilament or fluorocarbon leader).* – Preferred Alternative

Alternative A6a would require HMS permit holders that recreationally fish for, retain, possess, or land sharks to use circle hooks when fishing for, retaining, possessing, or landing sharks. Any shark caught on a hook other than a circle hook would have to be released. This requirement is intended to apply across the recreational shark fishery, including when participating in fishing tournaments that bestow points, prizes, or awards for sharks. To ensure that the measure encompasses all shark fishing activity, we also specify that a person on board an HMS-permitted vessel fishing with natural baits and using wire or heavy (200 lb test or greater) monofilament or fluorocarbon leaders (i.e., the terminal tackle most commonly used for shark fishing) would be presumed to be fishing for sharks. NMFS is specifically inviting public comment on whether this approach will ensure that the measure applies to the entire fishery or whether different indicators of recreational shark fishing should be adopted. By requiring circle hooks across the recreational shark fishery, dusky shark mortality is expected to decrease.

Alternative A6b Require the use of circle hooks by all HMS permit holders with a shark endorsement when fishing for sharks recreationally (when deploying natural bait while using a 5/0 or larger hook size).

Alternative A6b would require all HMS permit holders that recreationally fish for, retain, possess, or land sharks to use circle hooks when fishing for, retaining, possessing, or landing sharks. Any shark caught on a hook other than a circle hook would have to be released. This requirement is intended to apply across the recreational shark fishery, including when participating in fishing tournaments that bestow points, prizes, or awards for sharks. This alternative is the same as Alternative A6a, except that rather than characterizing shark fishing by leader material, it uses hook size (5/0 or greater) as an indicator of fishing for sharks. As with Alternative A6a, NMFS is specifically requesting information on whether the deployment of natural bait while using a 5/0 or larger hook size would encompass all recreational fishing for sharks. Based on public comment, NMFS could consider modifying this alternative as needed to encompass all recreational shark fishing whether by making minor modifications to the proposal (e.g., changing the hook size or including natural and artificial bait combinations) or adopting different criteria to encompass the group.

Alternative A6c Require the use of circle hooks by all Atlantic HMS permit holders participating in fishing tournaments when targeting or retaining Atlantic sharks.

When participating in fishing tournaments that bestow points, prizes, or awards for sharks, all Atlantic HMS permit holders would be required to use circle hooks. This requirement would apply primarily to HMS Angling and Charter/Headboat permit holders with a shark endorsement since they are the most likely to be fishing recreationally for sharks in tournaments. However, this requirement would also include commercial Atlantic tunas General category and Swordfish

General Commercial permit holders when fishing in a registered HMS tournament. HMS permit holders recreationally fishing for sharks outside of a tournament would not be required to use circle hooks.

Alternative A7 Allow only catch and release of all Atlantic sharks by HMS permit holders. Anglers could fish for and target sharks but retention of all recreationally-caught sharks would be prohibited.

Alternative A7 would prohibit all HMS permit holders fishing recreationally for sharks from retaining any shark species. Primarily, this requirement would apply to HMS Angling and Charter/Headboat permit holders since they are the most likely to be fishing recreationally. However, this requirement would also apply to Atlantic tunas General category and Swordfish General Commercial permit holders participating in registered HMS fishing tournaments and recreationally fishing for sharks. Recreational fishermen may still fish for and target authorized shark species for catch and release. All sharks would be required to be released in a manner that maximizes their likelihood of survival and without removing them the water, in order to reduce post-release mortality of dusky sharks. NMFS would also request that states implement complementary measures in states waters in order to reduce mortality of dusky sharks in state recreational fisheries. Regulations implemented under Alternative A7 would be similar to those currently in place for Atlantic white sharks.

2.2 Commercial Alternatives

NMFS is analyzing a range of alternatives in the commercial fisheries. In response to public comment, NMFS may make changes in Final Amendment 5b by modifying the preferred measures, selecting different alternatives, or additional or new measures, to meet the same purpose and need in the commercial fisheries.

Alternative B1: No Action. Do not implement additional management measures to end overfishing and rebuild dusky sharks in commercial HMS fisheries

This alternative would not implement any additional management measures in commercial HMS fisheries to decrease fishing mortality of dusky sharks. Under Alternative B1, all commercial measures including those for gears, permitting, and reporting would remain the same.

Alternative B2: Fishermen with an Atlantic shark limited access permit and pelagic longline gear onboard would be limited to 750 hooks per pelagic longline set and no more than 800 assembled gangions onboard at any time.

Under Alternative B2, participants holding an Atlantic shark limited access permit (directed or incidental) with pelagic longline gear onboard would be limited to 750 hooks per pelagic longline set, with no more than 800 assembled gangions onboard at any time. Fishermen could have extra components to assemble gangions (e.g., hooks, clips, monofilament line) onboard, as long as the number of assembled gangions does not exceed 800. Recent statistics on numbers of hooks per set are given in Table 2.1.

Table 2.1 Average Number of Hooks per Pelagic Longline Set (2008-2014). Source: 2015 Atlantic HMS SAFE Report.

Target Species	Average Number	2008	2009	2010	2011	2012	2013	2014	2015	Average
Swordfish	Hooks per Pelagic Longline Set	708	687	759	728	683	735	780	729	726
Bigeye tuna	Hooks per Pelagic Longline Set	751	755	653	802	865	620	811	641	751
Yellowfin tuna	Hooks per Pelagic Longline Set	678	689	687	645	628	638	608	571	653
Mix of tuna species	Hooks per Pelagic Longline Set	747	744	837	786	728	694	64	653	744
Shark	Hooks per Pelagic Longline Set	377	354	455	348	525	NA	293	298	392
Dolphin	Hooks per Pelagic Longline Set	989	1,033	1,131	1,082	1,129	933	1,093	1,140	1,056
Other species	Hooks per Pelagic Longline Set	NA	NA	467	400	300	NA	NA	150	389
Mix of species	Hooks per Pelagic Longline Set	749	781	761	749	758	717	722	737	748

Alternative B3: *Fishermen with an Atlantic shark limited access permit with pelagic longline gear onboard must release all sharks not being retained using a dehooker or by cutting the gangion less than three feet from the hook.* – Preferred Alternative

Under this alternative, NMFS would require Atlantic shark limited access permit holders (directed or incidental) fishing with pelagic longline gear to release all sharks that are not being boarded or retained by using a dehooker, or by cutting the gangion no more than three feet from the hook. This release requirement would be applied to all sharks, due to the difficulties in identifying dusky sharks from other shark species, particularly when the shark is in the water.

Alternative B4: Implement dusky shark hotspot closure areas for HMS vessels fishing with pelagic longline gear.

Under Alternative B4, NMFS would implement dusky shark hotspot closures for vessels fishing with pelagic longline gear. The hotspot closures would be areas in time and space where recent (2008-2014) HMS logbook data has shown increased levels of interactions with dusky sharks on pelagic longline gear. The goal of these hotspot closures would be to maximize the reduction of bycatch of dusky sharks, while minimizing reductions in target catch (e.g., swordfish, tunas) and

impacts on non-target species. The hotspot closures were designed to be as small as possible while still meeting the objectives of this action to minimize economic impacts. The hotspot closures considered are the same areas that were analyzed in Draft Amendment 5 and the A5b Predraft. During the months that hotspot closures are effective, Atlantic shark commercial permit holders (directed or incidental) would not be able to fish with pelagic longline in these areas.

Alternative B4a — Prohibit the use of pelagic longline gear in HMS fisheries in a portion of the Charleston Bump during the month of May ("Charleston Bump Hotspot May").

This alternative would prohibit the use of pelagic longline gear by all U.S. flagged-vessels permitted to fish for HMS in a portion of the existing Charleston Bump time/area closure during the month of May where high levels of dusky shark interactions have been reported in the HMS logbook (Figure 2.2). This closure would encompass approximately 3,622 nm^2 and would be defined as the area within the following coordinates, beginning with the northwest corner and proceeding clockwise: 31º 30' N. Lat., 80º 00' W. Long; 31º 30' N. Lat., 78º 20' W. Long.; 31º 00' N. Lat., 78º 20' W. Long.; and 31º 00' N. Lat., 80º 00' W. Long.

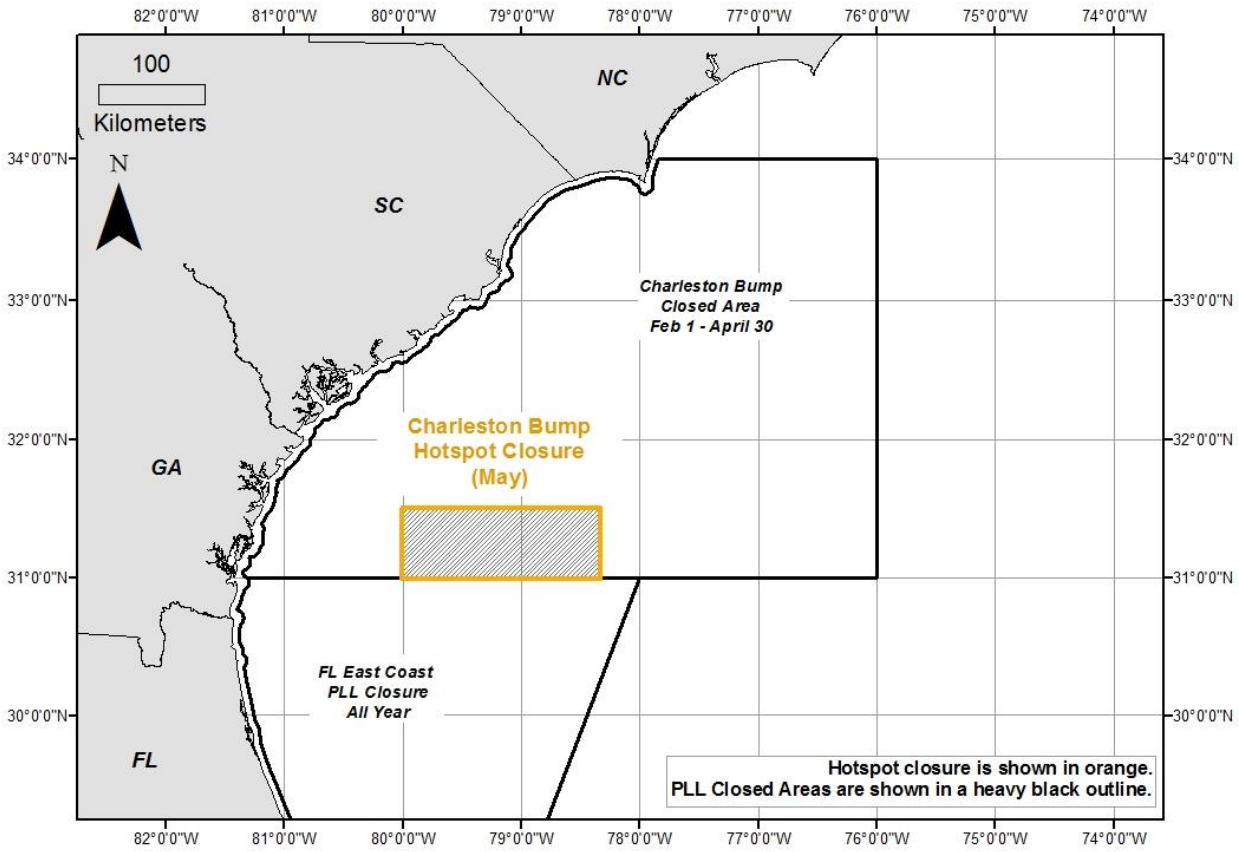

Figure 2.2 Charleston Bump Hotspot May Hotspot Closure Area (Alternative B4a). The Hotspot closure is shown in orange. Other current HMS closures are also shown.

Alternative B4b Prohibit the use of pelagic longline gear in HMS fisheries in the vicinity of the Cape Hatteras Special Research/Hatteras Shelf Area during the month of May ("Hatteras Shelf Hotspot May").

This alternative would prohibit the use of pelagic longline gear by all U.S. flagged-vessels permitted to fish for HMS in the vicinity of the "Hatteras Shelf" area of the Cape Hatteras Special Research Area during the months of May where elevated levels of dusky shark interactions have been reported (Figure 2.3). This closure would encompass approximately 1,482 nm^2 and would be defined as the area within the following coordinates, beginning with the northwest corner and proceeding clockwise: 36º 10' N. Lat., 75º 00' W. Long.; 36º 10' N. Lat., 74º 40' W. Long.; 35º 10' N. Lat., 74º 40' W. Long; 35º 10' N. Lat., 75º 00' W. Long.

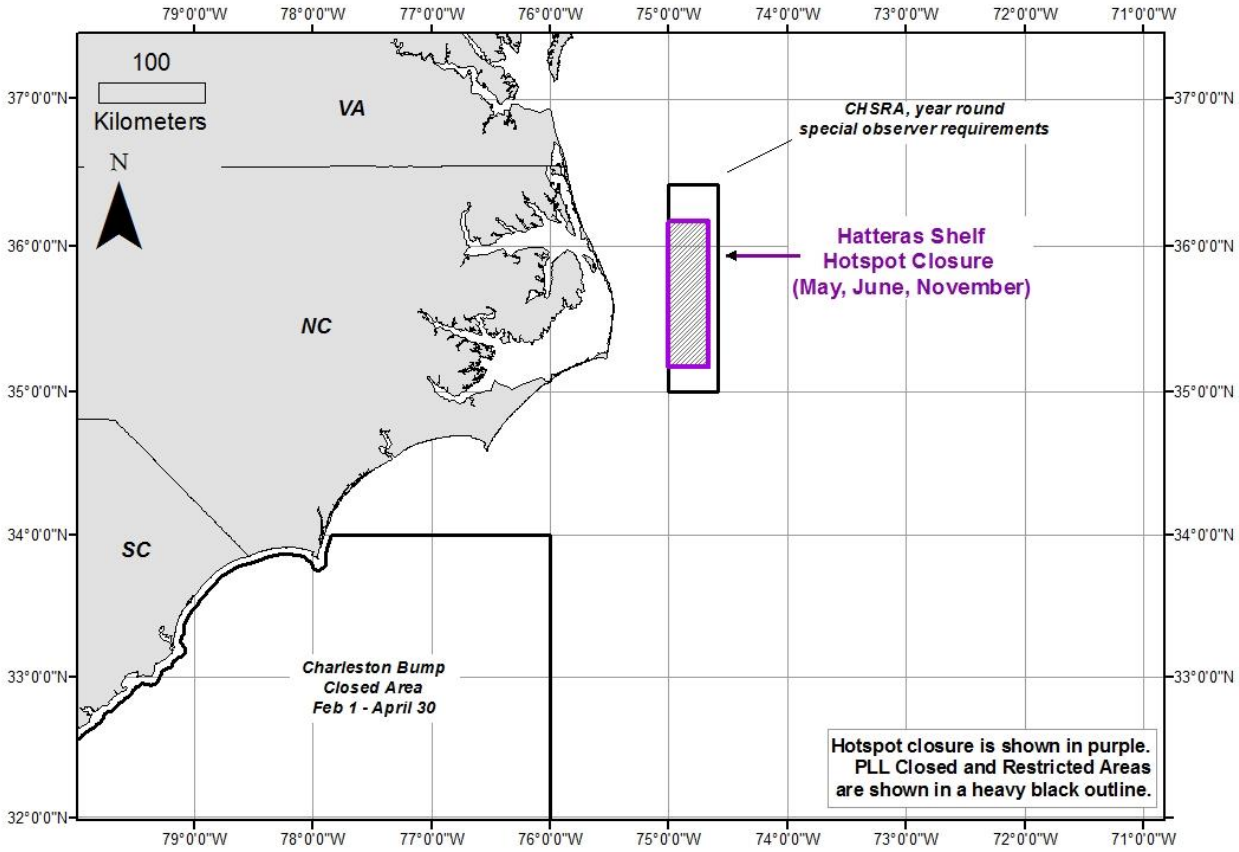

Figure 2.3 Hatteras Shelf Hotspot Closure Areas (May, June, and November; Alternative B4b-d). The Hotspot Closure is shown in purple. Other current HMS closures are also shown.

Alternative B4c Prohibit the use of pelagic longline gear in HMS fisheries in the vicinity of the Cape Hatteras Special Research/Hatteras Shelf Area during the month of June ("Hatteras Shelf Hotspot June").

This alternative would prohibit the use of pelagic longline gear by all U.S. flagged-vessels permitted to fish for HMS in the vicinity of the "Hatteras Shelf" area of the Cape Hatteras

Special Research Area during the month of June where elevated levels of dusky shark interactions have been reported (Figure 2.3). This Hotspot Closure would encompass approximately 1,482 nm^2 and would be defined as the area within the following coordinates, beginning with the northwest corner and proceeding clockwise: 36º 10' N. Lat., 75º 00' W. Long.; 36º 10' N. Lat., 74º 40' W. Long.; 35º 10' N. Lat., 74º 40' W. Long; 35º 10' N. Lat., 75º 00' W. Long.

Alternative B4d — Prohibit the use of pelagic longline gear in HMS fisheries in the vicinity of the Cape Hatteras Special Research/Hatteras Shelf Area during the month of November ("Hatteras Shelf Hotspot November").

This alternative would prohibit the use of pelagic longline gear by all U.S. flagged-vessels permitted to fish for HMS in the vicinity of the "Hatteras Shelf" area of the Cape Hatteras Special Research Area during the month of November where elevated levels of dusky shark interactions have been reported (Figure 2.3). This Hotspot Closure would encompass approximately 1,482 nm^2 and would be defined as the area within the following coordinates, beginning with the northwest corner and proceeding clockwise: 36º 10' N. Lat., 75º 0' W. Long.; 36º 10' N. Lat., 74º 40' W. Long.; 35º 10' N. Lat., 74º 40' W. Long; 35º 10' N. Lat., 75º 0' W. Long.

Alternative B4e — Prohibit the use of pelagic longline gear in HMS fisheries in three distinct closures in the vicinity of the Mid Atlantic Bight Canyons ("Canyons Hotspot October") during the month of October.

This alternative would prohibit the use of pelagic longline gear by all U.S. flagged-vessels permitted to fish for HMS in the three distinct Hotspot Closures in the vicinity of the Mid-Atlantic Canyons during the month of October where elevated levels of dusky shark interactions have been reported in the HMS logbook (Figure 2.4). Combining the three areas would encompass approximately 7,350 nm^2 and starting from south to north, the coordinates of the three areas beginning from the northwest corner and proceeding clockwise: South: 37º 30' N. Lat., 74º 50' W. Long.; 37º 30º N. Lat., 74º 20' W. Long.; 36º 30' N. Lat., 74º 20' W. Long.; 36º 30' N. Lat., 74º 50' W. Long. Middle: 39º 10' N. Lat., 73º 20' W. Long.; 39º 10' N. Lat., 72º 40' W. Long.; 38º 40' N. Lat., 72º 40' W. Long; 38º 40' N. Lat., 74º 50' W. Long. North: 40º 00' N. Lat., 72º 00' W. Long.; 40º 00' N. Lat., 70º 30' W. Long.; 39º 30' N. Lat., 70º 30' W. Long.; 39º 30' N. Lat., 72º 00' W. Long.

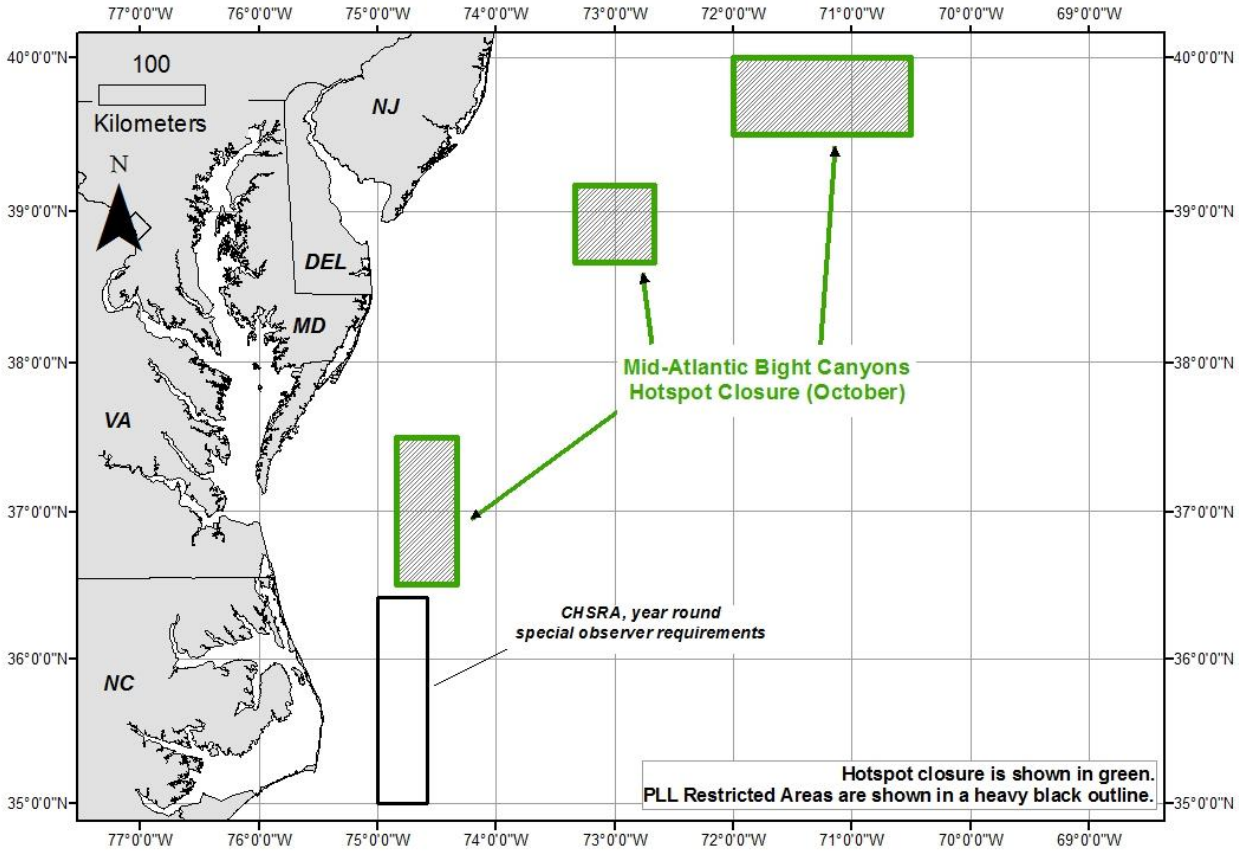

Figure 2.4 Canyons Hotspot October Hotspot Closure Areas (Alternative B4e). The Hotspot closure is shown in green. Other HMS closures are also shown.

Alternative B4f Prohibit the use of pelagic longline gear in HMS fisheries in an area in the vicinity of the existing Northeastern closed area during the month of July ("Southern Georges Banks Hotspot July").

This alternative would prohibit the use of pelagic longline gear by all U.S. flagged-vessels permitted to fish for HMS in July in an area adjacent to the existing Northeastern U.S. closure which is currently effective for the month of June, where elevated levels of dusky shark interactions have been reported (Figure 2.5). This closure would encompass approximately 12,994 nm^2 and would be defined as a parallelogram bounded by the following coordinates, beginning with the northwestern-most corner and proceeding clockwise: 40º 50'N. Lat., 68º 50' W. Long.; 40º 50' N. Lat., 66º 30' W. Long.; 39º 40' N. Lat., 67º 40' W. Long.; 39º 40' N. Lat., 70º 00' W. Long.

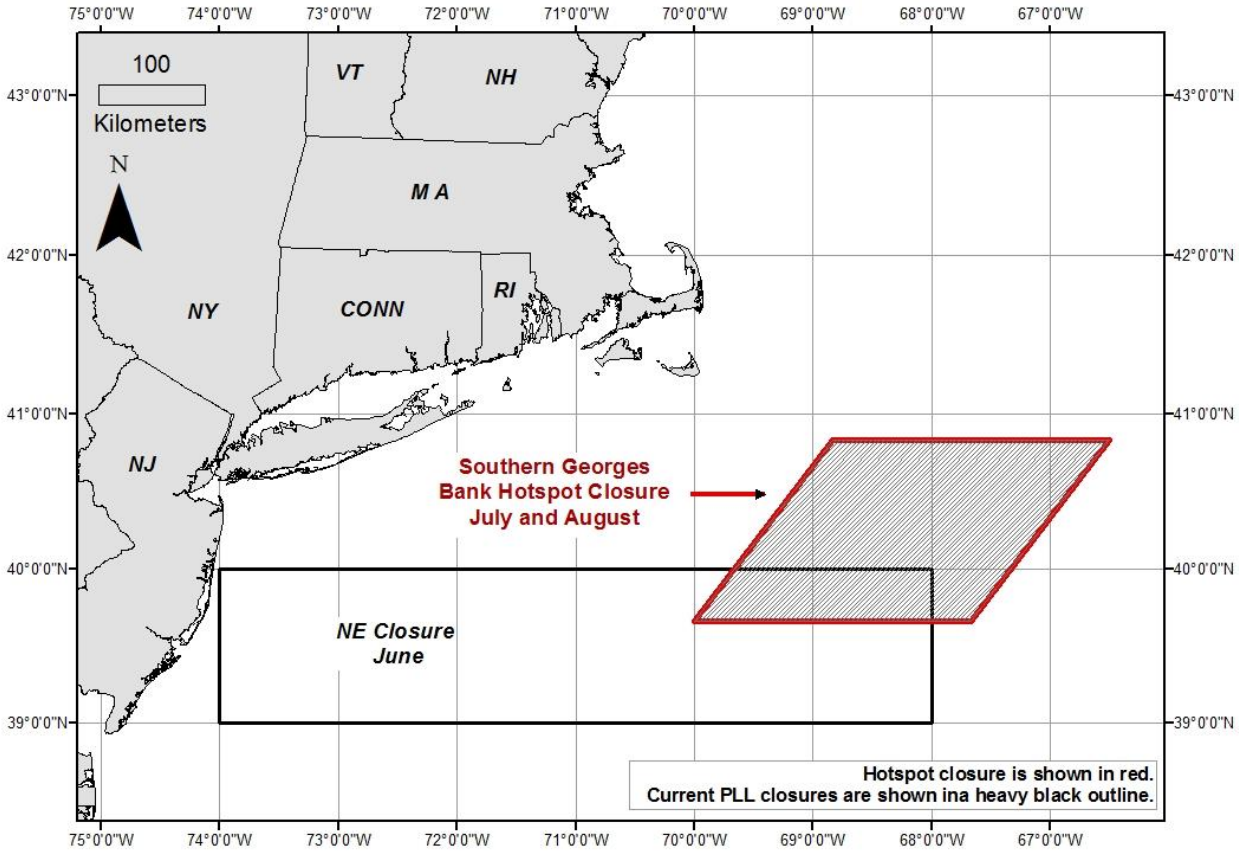

Figure 2.5 Southern Georges Bank Hotspot Closure Areas (July and August; Alternative B4f and B4g). The Hotspot Closure gear restricted area is shown in red. Other HMS closure areas, including the Northeast Closure, are also shown.

Alternative B4g Prohibit the use of pelagic longline gear in HMS fisheries in an area in the vicinity of the existing Northeastern closed area during the month of August ("Southern Georges Banks Hotspot August").

This alternative would prohibit the use of pelagic longline gear by all U.S. flagged-vessels permitted to fish for HMS in August in an area adjacent to the existing Northeastern U.S. closure, which is currently effective for the month of June, where elevated levels of dusky shark interactions have been reported (Figure 2.5). This Hotspot Closure would encompass approximately 12,994 nm^2 and would be defined as a parallelogram bounded by the following coordinates, beginning with the northwestern-most corner and proceeding clockwise: 40º 50'N. Lat., 68º 50' W. Long.; 40º 50' N. Lat., 66º 30' W. Long.; 39º 40' N. Lat., 67º 40' W. Long.; 39º 40' N. Lat., 70º 00' W. Long.

Alternative B4h Prohibit the use of pelagic longline gear in HMS fisheries in a portion of the Charleston Bump during the month of November ("Charleston Bump Hotspot November").

This alternative would prohibit the use of pelagic longline gear by all U.S. flagged-vessels permitted to fish for HMS in a portion of the existing Charleston Bump time/area closure during the month of November where elevated levels of dusky shark interactions have been reported (Figure 2.6). This Hotspot Closure would encompass approximately 586 nm^2 and would be defined as a parallelogram bounded by the following coordinates, beginning with the northwestern-most corner and proceeding clockwise:: 31º 10' N. Lat., 79º 20' W. Long; 31º 10' N. Lat., 79º 10' W. Long.; 31º 20' N. Lat., 79º 10' W. Long; 31º 20' N. Lat., 78º 50' W. Long.; 31º 00' N. Lat., 78º 50' W. Long; 31º 00' N. Lat., 79º 20' W. Long.

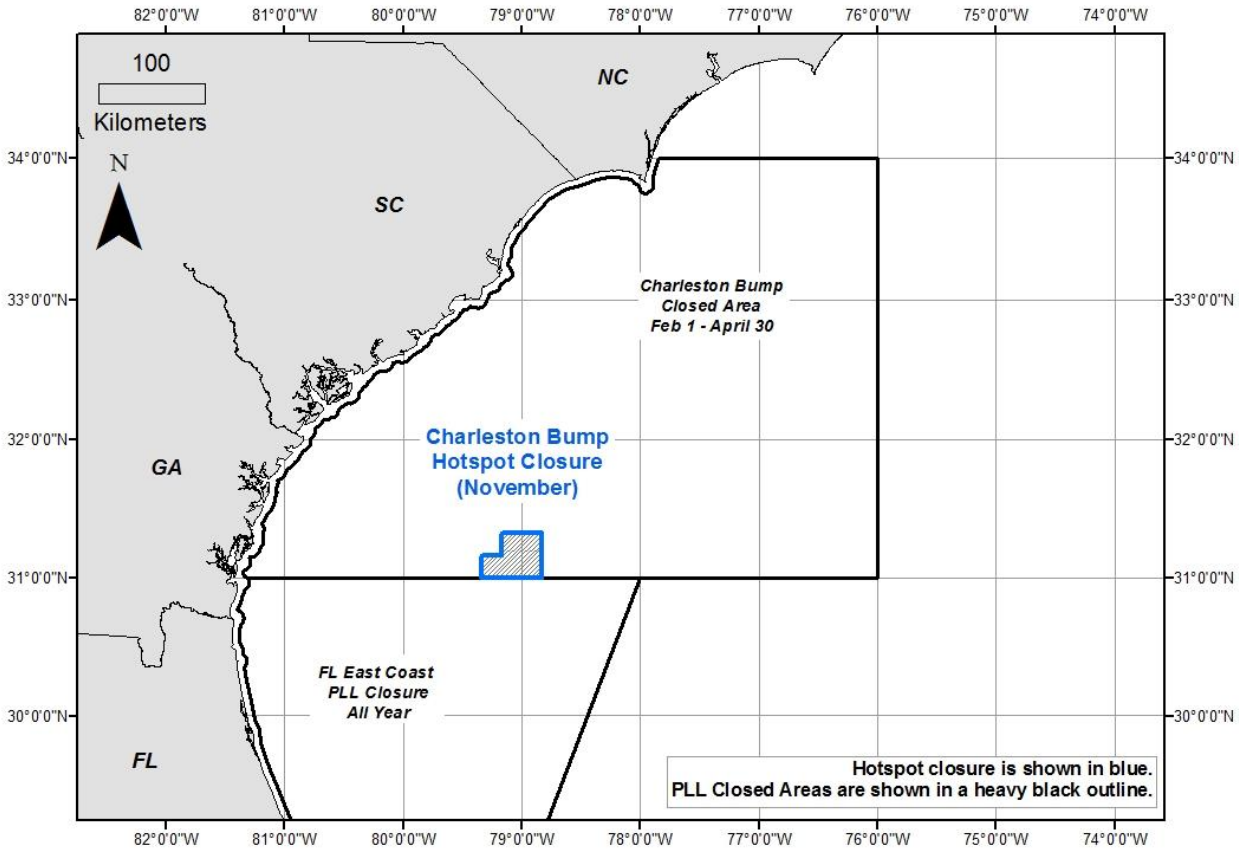

Figure 2.6 Charleston Bump Hotspot November Hotspot Closure Area (Alternative B4h). The Hotspot Closure is shown in blue. Other HMS closures are also shown.

Alternative B4i Allow conditional access to dusky shark hotspot closure areas for HMS vessels fishing with pelagic longline gear.

NMFS would allow conditional access to dusky shark hotspot closure areas for the vessels fishing with pelagic longline gear who report or are observed interacting with the fewest dusky sharks in a year. Such conditional access might provide an incentive to avoid dusky sharks by modifying fishing behavior. This alternative would balance reducing dusky shark interactions with providing reasonable fishing opportunity to participants in the pelagic longline fleet that have demonstrated an ability to avoid dusky sharks. On an annual basis, NMFS would review pelagic longline vessel logbook records for reported dusky interactions, sort vessels from highest to lowest in terms of number of reported interactions, and a derive a cumulative frequency as in Table 2.2. NMFS would determine the number of vessels contributing to a "substantial proportion" of dusky shark interactions and would not allow them conditional access to the dusky shark hotspot closure areas. Using 2008 to 2015 as an example, and using 70 percent of reported interactions as a substantial proportion, the number of vessels that would not have access to the hotspot closure areas in a given year would range from 4 to 12 (Table 2.2).

Table 2.2 Summary of cumulative frequency analysis to determine the number of vessels contributing to a large proportion of dusky shark interactions (up to 70% of the interactions). Vessels were sorted each year and overall from highest to lowest in terms of number of dusky shark interactions, and a cumulative frequency was derived. Data Source: HMS Logbook Data, 2008 - 2015.

Year	Number of Vessels with a Dusky Shark Interaction	Total Number of Vessels	Percentage of Vessels with a Dusky Shark Interaction	Number of Vessels With Up to 70 Percent of Dusky Interactions	Percentage of Vessels without a Dusky Shark Interaction
2008	47	121	38.8	12	61.2
2009	40	115	34.8	6	65.2
2010	41	116	35.3	4	64.7
2011	29	117	24.7	4	75.3
2012	43	122	35.3	6	64.7
2013	28	115	24.4	4	75.6
2014	25	110	22.7	7	77.3
2015	35	104	33.7	11	66.3
2008-2015	106	169	62.7	20	37.3

NMFS would not define "substantial proportion of dusky shark interactions" as a single specific percentage that would remain the same from year to year. Rather, NMFS would annually evaluate overall and vessel-specific catch rates, dusky shark stock status, fishery trends, and other relevant factors in determining the specific percentage for a given year. A single specific percentage would not be appropriate because the relatively rare event of dusky shark catches could lead to situations where relatively low numbers of interactions could result in high percentages (e.g., 1 interaction out of a total of 2 interactions is 50 percent). This type of situation could happen more frequently as vessels modify fishing behavior to avoid dusky sharks as result of dusky communication protocols (preferred Alternative B6). By reviewing fishery data and setting an annual proportion, NMFS would retain the flexibility to meet the objective of this alternative – to allow conditional access to the hotspot closure areas to vessels with a demonstrated ability to avoid interacting with dusky sharks – while avoiding a situation where

percentages associated with rare events lead to a large number of vessels being not allowed into the hotspot closure areas despite relatively low numbers of dusky shark interactions. NMFS would also review the Pelagic Observer Program reports on an annual basis and compare observer reports of dusky sharks with logbook records for the observed trips.

Alternative B4j Implement dusky shark bycatch caps in the pelagic longline fishery.

This alternative would implement bycatch caps on dusky shark interactions in hotspot areas on a three-year basis. Under this alternative, NMFS would establish specific limits or caps on how many dusky sharks could be caught in each hot spot area and allow pelagic longline vessels in those hot spot areas as long as there is an observer onboard. Once the dusky shark bycatch cap for a particular area is reached, that area would close until the end of the three-year bycatch cap period.

Alternative B5: *Require completion of a shark identification and fishing regulation training as a new part of the Safe Handling and Release Workshop for vessel owners and operators of a HMS limited access permitted vessel that fishes with pelagic longline, bottom longline, or shark gillnet gear* – Preferred Alternative

Under Alternative B5, NMFS would require completion of shark identification, handling and release, and fishing regulation training as part of the Safe Handling and Release Workshop for all HMS pelagic longline, bottom longline, and shark gillnet vessel owners and operators. HMS vessels owners and operators are required to participant in the safe handling and release workshop every three years. Under this alternative, the training curriculum for all workshops after implementation of the final rule for this Amendment would be modified to include a section on shark identification, handling and release, and fishing regulations. All safe handling, identification, and release certificates issued before implementation of the final rule would remain valid until the expiration date on the certificate. At that time, vessel owners and operators would need to attend a workshop with the modified curriculum, as is currently required. While vessel owners and operators could attend workshops sooner than this, in general, the full effect of this alternative would not be known until all vessel owners and operators have gone through the training, which would be approximately three years after the publication of the final rule.

Alternative B6: *Increase dusky shark outreach and awareness through development of additional commercial fishery outreach materials, and require pelagic longline, bottom longline, and shark gillnet vessels with shark limited access permits to abide by a dusky shark fleet communication and relocation protocol*. – Preferred Alternative

NMFS would develop additional outreach materials for commercial fisheries regarding shark identification, and regulations that would focus on dusky sharks. Alternative B6 would require that all vessels with an Atlantic shark limited access permit and fishing with pelagic longline, bottom longline, or shark gillnet gears abide by a dusky shark fleet communication and

relocation protocol. The protocol would require vessels to report the location of dusky shark interactions over the radio to other vessels in the area and that subsequent fishing sets on that fishing trip could be no closer than 1 nautical mile (nm) from where the encounter took place. Additional awareness from enhanced outreach methods and the fleet communication protocol should help reduce bycatch of dusky sharks.

Alternative B7: Request that certain states (New Jersey, Delaware, Maryland, Virginia) and the ASMFC extend the end of existing Mid-Atlantic shark time/area closure from July 15 to July 31.

This alternative would request the states (New Jersey, Delaware, Maryland, Virginia) and ASMFC consider extending the shark commercial seasonal closure from July 15 to July 31 to offer additional protection for dusky sharks in nursery areas. Currently, NMFS has a Mid-Atlantic shark time/area closure off North Carolina, which serves as nursery and pupping areas for sandbar and dusky sharks. The area is closed to vessels using bottom longline gear from January 1 to July 31 each year. Extending the state closures to July 31 may provide additional protection for dusky sharks.

Alternative B8: Close Atlantic HMS Pelagic Longline Fishery.

Alternative B8 would prohibit the use of pelagic longline gear for Atlantic HMS in the Atlantic, Gulf of Mexico, and Caribbean to reduce bycatch of dusky sharks.

Alternative B9: *Require the use of circle hooks by all shark directed limited access permit holders in the bottom longline fishery.* – Preferred Alternative

Alternative B9 would require all HMS shark directed limited access permit holders to use circle hooks in the bottom longline fishery. This alternative is similar to the existing regulation for HMS permit holders in the pelagic longline fishery except this alternative does not specify hook size

Alternative B10: Implement Individual Dusky Shark Bycatch Quotas (IDQs) for the commercial pelagic and bottom longline fisheries.

Under this alternative, NMFS would annually allocate a certain number of allowable dusky shark interactions to each individual shark directed or incidental limited access permit holder in the HMS pelagic and bottom longline fisheries. These allocations would be transferable between permit holders. When each vessel's individual dusky shark bycatch quota (IDQ) is reached, the vessel would no longer be authorized to fish for HMS for the remainder of the year. The concept of this alternative is similar to the Individual Bluefin Tuna Quota (IBQ) Program implemented in Amendment 7 to the 2006 Consolidated HMS FMP (79 FR 71510), which established individual quotas for bluefin tuna bycatch in the pelagic longline fishery and authorized retention and sale of such bycatch. We would not, however, anticipate authorizing retention and sale of dusky sharks, since they remain a prohibited species.

The IDQ system would require electronic monitoring (EM) capabilities to be installed on every IDQ vessel to monitor dusky shark interactions. EM would be a new requirement for bottom longline vessels, or other permit holders that do not fish with IBQ allocation under Amendment 7. Electronic monitoring (EM) systems are already required for vessels fishing in the pelagic longline fishery. Fishing practices for those vessels may need to be altered further, however, to effectively monitor dusky shark interactions through the existing EM systems. For example, while bluefin tuna are readily identifiable and distinguishable from other species upon normal haulback operations, dusky sharks (as discussed previously) are difficult to distinguish from other sharks, and thus sharks caught on longline gear would have to be lifted on board so that identifying features can be viewed sufficiently for the camera.

Further detail on implementation of such a program is not available at this time because NMFS is not able to identify a scientifically-supportable methodology for setting the overall allowable "bycatch quota" in the PLL and BLL shark fisheries, nor have we identified an appropriate basis for then distributing any such quota within the category to individual vessels. We invite public comment on this alternative and note that the scope of the alternative may change between the proposed and final rule.

2.3 Alternatives Considered but Not Further Analyzed

Require Weak Hooks

NMFS considered analyzing an alternative that would require the use of "weak" hooks by all Atlantic HMS permit holders. Weak hooks are made of lighter gauge than other hooks used in a particular area, and are specifically designed to bend and straighten when larger, heavier fish (like bluefin tuna) are hooked, while holding their shape for smaller, lighter fish (such as swordfish, other tunas, billfishes, and smaller sharks). In addition to the weight of the fish, there are several factors that contribute to the application of the level of force necessary to straighten a hook during the interactions with animals including: water temperature; currents; fishing depth; hooks between floats; distance to the nearest float; interaction with other animals on the longline; configuration of the gear and knots used to splice the mainline; and, vessel hauling practices.

While it is theoretically possible that requiring the use of weak hooks could reduce the bycatch of large sharks, including large dusky sharks and other prohibited shark species, there is insufficient scientific information specific to weak hooks and dusky sharks available to support this hypothesis or to provide a basis for meaningful analysis of this as an alternative. The stock assessment indicates that many dusky shark interactions are with smaller, juvenile fish (SEDAR 21) and, for weak hooks to have a positive impact by releasing the fish, the fish have to be large and heavy enough to straighten the weak hooks. Currently, HMS pelagic longline fishermen are required to use a type of weak hook (wire gauge must be less than 3.65 mm in diameter) in the Gulf of Mexico to reduce bluefin tuna mortality in recognized spawning grounds. Spawning bluefin tuna are much heavier than juvenile dusky sharks and, for larger sharks, the bluefin parameters in the Gulf cannot be presumed to be applicable to large dusky sharks in the Atlantic. NMFS based the Gulf of Mexico weak hook requirement on scientific evidence that specifically analyzed spawning bluefin tuna in the Gulf of Mexico and determined the conditions under which they will straighten a weak hook in the Gulf conditions. Similarly, the Pelagic Longline

Take Reduction Team (PLTRT) is currently considering the use of different weak hooks (ones that are stronger than those required to be used in the Gulf of Mexico) in the HMS pelagic longline fishery along the Atlantic coast to reduce pilot whale and Risso's dolphin mortality (PLTRT 2015) and this consideration reflects years of analysis and study of weak hooks specific to those species.

At base, it has been shown that because of the differences in the water currents, the weak hook studied and being used in the Gulf of Mexico could not be used along the Atlantic coast; such weak hooks have been shown to bend even when light fish are caught thus negating the very purpose and value of the "weak hook" approach, which is to release heavier fish while keeping lighter directed catch on the hook. Thus, additional scientific study would be needed on the efficacy of weak hooks in the Atlantic and specifically on the effect on dusky sharks, what could be an appropriate wire gauge and hook diameter to release the species while maintaining target catch, and the effect of such hooks on post-release mortality of the species. At this time, there is not enough scientific information about the potential effects of weak hooks on dusky sharks, including the degree of reduction in dusky shark bycatch and mortality; effect on target species catch; technological feasibility; other potential consequences; and fishing practicality. All of these aspects would have to be analyzed in order for the alternative to be meaningful and to assess whether it could meet or contribute to the purpose and need of this Amendment. In the absence of available scientific information providing a basis for meaningful analysis, NMFS has determined that this measure as an alternative could not meet the objectives of this amendment, is not scientifically supportable, and could not be appropriately analyzed as a reasonable alternative.

Dusky Shark Bycatch Caps in Non-HMS Fisheries

Although draft Amendment 5b would amend the 2006 Consolidated HMS FMP (which addresses Secretarially-managed fisheries for highly migratory species), NMFS did consider analyzing an alternative that would annually recommend allocations or allocate a specific number of "allowable" dead discards of dusky sharks to each Council-managed fishery that has interactions with dusky sharks as a bycatch cap or "sub-ACL." A bycatch cap works by setting a cap that, when reached, then closes the associated directed fishery for the remainder of the fishing year. If the bycatch cap, or sub-ACL, is exceeded in a particular year, AMs would be applied to that fishery to prevent additional overages. Although there is little reliable data on this front, this could potentially include fisheries managed by the New England, Mid-Atlantic, South Atlantic, Gulf of Mexico, and Caribbean Fishery Management Councils through their FMPs and Council processes.

We are not able to analyze this as an alternative for several reasons. First, there is not sufficient scientifically-supportable information on dusky shark bycatch that would allow us to accurately determine which fisheries should be subject to the caps, determine at which level they should be capped, and analyze the effects of the action or the extent to which the measure would be effective in reducing dusky shark bycatch and mortality. As described in Chapter 1.0, there is no scientifically-valid method for accurately estimating total dusky shark catch, and therefore, no basis for establishing a supportable overall ACL for the entire stock. This is the primary reason that the SEDAR 21 stock assessment and update used a catch-free modeling approach after

considering all of the available data on bycatch. This is also why the ACL for the prohibited shark complex is specified as equal to zero. As discussed previously, any estimated ACL greater than zero, whether for all prohibited sharks or for dusky sharks alone, would have extremely high uncertainty, no confidence in its likelihood to end overfishing and rebuild the stock, and may encourage increased catch. Without a basis for establishing an overall acceptable level of catch, there is also no defensible basis for establishing the number of dusky sharks to be allocated to individual fisheries. Although some sources of bycatch data exist, they are not accurate or reliable enough to use as a basis for setting caps, nor could we properly use information rejected by the stock assessment as the basis for such a management measure. The numbers would simply be too speculative.

Second, similar to the challenges in estimating total catch, monitoring catches or interactions against the bycatch caps would not be feasible in real-time during the fishing year. As described in Chapter 1.0, observed catches of prohibited sharks are rare and have high interannual variability. This is compounded by difficulties in identification and reporting issues. This is why NMFS is proposing to use three-year rolling averages to monitor prohibited shark bycatch, to smooth out the inter-annual variability.

Third, based upon the best available data on dusky shark bycatch (Table 1.3 andTable 1.4), observed dead discards appear to be low (2013-2015 average = 281 sharks). Even if it were possible to extrapolate observed catches to total bycatch estimates with a high degree of confidence (which was not considered acceptable for stock assessment purposes in SEDAR 21), such extrapolations would be highly uncertain and inaccurate, as emphasized by SEDAR 21 in rejecting this approach. Thus, by using this not scientifically-supportable approach just to come up with a number, the total number of sharks available for allocation could be disproportionately and inappropriately small.

We were able to analyze a dusky shark bycatch cap proposal in the HMS pelagic longline fishery above (Alternative B4j) because we have better bycatch data on dusky sharks in that fishery and would require 100 percent observer coverage under that alternative. We were able to estimate the dusky shark bycatch in the hostpots based on observer and logbook data. We cannot do that in the other (non-HMS) fisheries (or even in other sectors of the HMS fisheries like BLL and recreational fisheries) with the same level of confidence because of misidentification problems and high uncertainty in reported and observed catches.

2.4 References

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SEDAR 2016a. Update assessment to SEDAR 21 – HMS Dusky Shark. SEDAR, North Charleston SC. 64 pp. available online at: http://sedarweb.org/docs/suar/Dusky_update_report_2016.pdf

SEDAR 2016b. Update assessment to SEDAR 21 - HMS Dusky Shark: Addendum and Post-Review Updates. 25 pp.

3.0 Description of Affected Environment

This chapter describes the affected environment (the fishery, the gears used, the communities involved, *etc*.), and provides a view of the current condition of the fishery, which serves as a baseline against which to compare potential impacts of the different alternatives. This chapter also provides a summary of information concerning the biological status of the dusky shark stock, the marine ecosystems in the fishery management unit, the social and economic condition of the fishing interests, fishing communities, and fish processing industries, and the best available scientific information concerning the past, present, and possible future condition of shark stocks, ecosystems, and fisheries.

3.1 Introduction to Highly Migratory Species Management and Highly Migratory Species Fisheries

The authority to manage Atlantic HMS fisheries was designated to NMFS by the Secretary of Commerce. The HMS Management Division develops regulations for Atlantic HMS fisheries within NMFS, although some actions (*e.g.*, Large Whale Take Reduction Plan) are taken by other NMFS offices if the main legislation (*e.g.*, Marine Mammal Protection Act) driving the action is not the Magnuson-Stevens Act or Atlantic Tunas Convention Act (ATCA). HMS fisheries require management at the international, national, and state levels because of their highly migratory nature. NMFS manages HMS fisheries in federal waters (domestic) and the high seas (international), while individual states establish regulations for some HMS in their own waters. However, there are exceptions to this generalization. For example, as a condition of their permit, federally-permitted shark fishermen are required to follow federal regulations in all waters, including state waters, unless the state has more restrictive regulations, in which case the state laws prevail. Additionally, in 2005, the Atlantic States Marine Fisheries Commission (ASMFC) agreed to develop an interstate coastal shark Fishery Management Plan (FMP). This interstate FMP coordinates management measures among all states along the Atlantic coast (Florida to Maine). NMFS participated in the development of this interstate shark FMP, which was effective in 2010.

While NMFS does not generally manage HMS fisheries in state waters, states are invited to send representatives to HMS Advisory Panel (AP) meetings and to participate in stock assessments, public hearings, or other fora. NMFS continues to work on improving its communication and coordination with state agencies and welcomes comments from states about various shark measures. NMFS will share this proposed FMP amendment with the Atlantic, Gulf of Mexico, Caribbean states, and territories and will work with states, to the extent practicable, to ensure complementary regulations. Please see Section 3.1 for more information regarding regulations by state.

On the international level, NMFS participates in the stock assessments conducted by the International Commission for the Conservation of Atlantic Tunas' (ICCAT) Standing Committee on Research and Statistics (SCRS) and in the annual ICCAT meetings. NMFS implements conservation and management measures adopted through ICCAT and through other relevant international agreements, consistent with specific domestic implementing legislation and the Magnuson-Stevens Act. In regard to sharks, ICCAT has assessed the Atlantic blue and the

shortfin mako shark stocks, participated with the International Council for the Exploration of the Sea (ICES) on a joint porbeagle assessment, and has conducted several ecosystem risk assessments for various shark species, among other things. Stock assessments and management recommendations or resolutions are listed on ICCAT's website at http://www.iccat.es/. As described below, in recent years ICCAT has adopted several shark-specific recommendations. ATCA authorizes NMFS to promulgate regulations as may be necessary and appropriate to implement ICCAT recommendations domestically.

NMFS also actively participates in other international bodies that could affect U.S. shark fishermen and the shark industry including the Convention on International Trade in Endangered Species (CITES) and the Food and Agriculture Organization (FAO). Several shark species, including white, basking, oceanic whitetip, porbeagle, and hammerhead sharks, have been listed under Appendix II under CITES. Under Appendix II, international trade is monitored and tracked. Dealers wishing to import or export shark species listed must obtain certain permits and follow reporting requirements as established by the U.S. Fish and Wildlife Service.

3.1.1 History of Domestic Shark Management

Sharks are managed along with other HMS species. Thus, management of the shark fishery is presented in FMPs along with Atlantic billfish, Atlantic tunas, and Atlantic swordfish. This section provides a brief history of fisheries management of Atlantic sharks. For more information on the complete HMS management history as it relates to sharks, please refer to the 2006 Consolidated HMS FMP (NMFS 2006a) and Amendments 2, 3, 5a, 6, and 9 to the 2006 Consolidated HMS FMP, which addressed shark conservation and management. Relevant proposed rules, final rules, and other official notices can also be found in the Federal Register at: https://www.federalregister.gov/. Supporting documents, including the original FMPs, can be found on the HMS Management Division's webpage at http://www.nmfs.noaa.gov/sfa/hms. Documents can also be requested by calling the HMS Management Division at (301) 427-8503.

Seventy-three species of sharks are known to inhabit the waters along the U.S. Atlantic coast, including the Gulf of Mexico and the waters around Puerto Rico and the U.S. Virgin Islands. Forty-two species are managed by NMFS' HMS Management Division. Based on ecology and fishery dynamics, NMFS divided HMS sharks into five species groups or complexes for purposes of HMS management: (1) LCS, (2) SCS, (3) pelagic sharks, (4) prohibited species, and (5) smoothhound sharks (Table 3.1). HMS deepwater sharks were previously removed from Federal management in Amendment 1 to the 1999 FMP in 2003. There are no fisheries targeting deepwater sharks. NMFS will continue to include sharks in this group for data reporting under the original 1993 Atlantic Shark FMP.

Table 3.1 Common names of shark species included within the five species complexes.

Species Complex	Shark Species Included
LCS (11)	Sandbar+, silky*, tiger, blacktip, bull, spinner, lemon, nurse, smooth hammerhead*^, scalloped hammerhead*°^, and great hammerhead*^ sharks
SCS (4)	Atlantic sharpnose, blacknose, finetooth, and bonnethead sharks
Pelagic Sharks (5)	Shortfin mako, thresher, oceanic whitetip*^, porbeagle^$, and blue sharks
Prohibited Species (19)	Whale^, basking^, sand tiger, bigeye sand tiger, white^, dusky, night, bignose, Galapagos, Caribbean reef, narrowtooth, longfin mako, bigeye thresher, sevengill, sixgill, bigeye sixgill, Caribbean sharpnose, smalltail, and Atlantic angel sharks
Smoothhound Sharks (3)	Smooth dogfish, Florida smoothhound, and Gulf smoothhound

*Prohibited from commercial retention on pelagic longline gear and recreationally if swordfish, tunas, and/or billfish are also retained
+ Prohibited from retention with the exception of vessels selected to participate in the shark research fishery
° Distinct population segment (DPS) in the central and southwest Atlantic Ocean listed as threatened under the Endangered Species Act
^ Listed under CITES Appendix II
$ Must be released when caught alive on pelagic longline gear and recreationally if swordfish, tunas, and/or billfish are also retained

In the 1999 FMP, NMFS noted that dusky sharks were highly susceptible and vulnerable to overfishing due to several factors, including: (1) delayed sexual maturity (approximately 19 years or approximately 12 ft or 3.7 m FL); (2) low fecundity (6 to 14 per litter); (3) a long gestation period (approximately 16 months); and (4) approximately 82 percent of those caught in commercial fisheries are brought to the vessel dead, making dusky sharks highly susceptible to dying on longline gear. This vulnerability has resulted in dusky sharks being listed as a species of concern under the Endangered Species Act (ESA) since 1997, and in 1999, being placed on the prohibited species list (due to litigation, the dusky shark prohibition did not go into effect until mid-2000). NMFS later revised the regulations to establish criteria for adding species to the prohibited species list. These regulations state that NMFS may add species to the prohibited shark species group if they meet at least two of the criteria listed at 50 CFR 635.34(c)(1)-(4).

Amendment 2 to the 2006 Consolidated HMS FMP

In 2008, NMFS implemented Amendment 2 to the 2006 Consolidated HMS FMP (Amendment 2), which, as described below, was a major action that changed how the shark fishery operated by implementing a prohibition on the landing and sale of sandbar sharks except for a limited number of shark fishermen participating in a shark research fishery, a reduced trip limit for all directed shark permit holders, and a requirement to land all sharks with fins naturally attached. NMFS used landings data from 2008 onward to conduct analyses for the options that are

considered in this document to appropriately reflect those changed operations and the current management of the fisheries.

On April 10, 2008, NMFS issued the FEIS for Amendment 2 to the 2006 Consolidated HMS FMP, based on several stock assessments that were completed in 2005/2006. Those stock assessments for dusky (*Carcharhinus obscurus*) and sandbar sharks (*C. plumbeus*) indicated that these species were overfished with overfishing occurring and that porbeagle sharks (*Lamna nasus*) were overfished. In Amendment 2, NMFS implemented management measures consistent with stock assessments for sandbar, porbeagle, dusky, blacktip (*C. limbatus*), and the LCS complex. The implementing regulations were published on June 24, 2008 (73 FR 35778; corrected version published July 15, 2008; 73 FR 40658). Management measures implemented in Amendment 2 included, but were not limited to, establishing rebuilding plans for porbeagle, dusky, and sandbar sharks consistent with stock assessments; implementing commercial quotas and retention limits consistent with stock assessment recommendations to prevent overfishing and rebuild overfished stocks; modifying recreational measures to reduce fishing mortality of overfished/overfishing stocks; modifying reporting requirements; requiring that all Atlantic sharks be offloaded with fins naturally attached; collecting shark life history information via the implementation of a shark research program; and implementing time/area closures recommended by the South Atlantic Fishery Management Council.

Amendment 3 to the 2006 Consolidated HMS FMP

Based on the 2007 SCS SEDAR 13 stock assessment, which was an update to the 2002 SCS stock assessment, NMFS determined blacknose sharks (*C. acronotus*) to be overfished with overfishing occurring in 2008 (73 FR 25665, May 7, 2008). In 2008, ICCAT's SCRS conducted an updated species-specific stock assessment for North Atlantic shortfin mako sharks (*Isurus oxyrinchus*). Based on the results of the ICCAT stock assessment, the United States determined that the stock was experiencing overfishing and was not overfished but was approaching an overfished condition. Based on this stock assessment, NMFS determined that North Atlantic shortfin mako sharks had been experiencing overfishing as of December 31, 2008 (74 FR 29185, July 19, 2009). To address the results of these stock assessments, NMFS released the FEIS for Amendment 3 to the 2006 Consolidated HMS FMP (Amendment 3) to implement management measures to rebuild blacknose sharks and end overfishing of blacknose and shortfin mako shark. The implementing regulations were published on June 1, 2010 (75 FR 30484). Management measures implemented in Amendment 3 included, but were not limited to, establishing a non-blacknose SCS quota of 221.6 mt dw and a blacknose shark quota of 19.9 mt dw. These quotas were linked to ensure both fisheries close when one of the quotas is reached.

This amendment also added smoothhound sharks (smooth dogfish (*Mustelus canis*) and Florida smoothhound (*M. norrisi*)) under NMFS management and established various measures such as a commercial quota and permitting and reporting mechanisms. As described below under Amendment 9, implementation of smoothhound management measures analyzed in Amendment 3 was delayed indefinitely. However, the final rule implementing the smoothhound measures established in Amendment 3 published in November 2015.

Amendment 5 to the 2006 Consolidated HMS FMP

Based on a stock assessment for scalloped hammerhead sharks (*Sphyrna lewini*), NMFS made the determination on April 28, 2011, that scalloped hammerhead sharks were overfished and experiencing overfishing (76 FR 23794). Following this determination, on October 7, 2011, NMFS published a notice announcing its intent to prepare Amendment 5 to the 2006 Consolidated HMS FMP (Amendment 5) with an Environmental Impact Statement in accordance with the requirements of the National Environmental Policy Act (76 FR 62331). NMFS made stock status determinations for sandbar, dusky, and blacknose sharks based on the results of SEDAR 21. Determinations in the October 2011 notice included that sandbar sharks were still overfished, but no longer experiencing overfishing, and that dusky sharks were still overfished and still experiencing overfishing (i.e., the dusky shark stock status had not changed). The October 2011 notice also acknowledged that there are two stocks of blacknose sharks, the Atlantic blacknose shark stock and the Gulf of Mexico blacknose shark stock. The determination stated that the Atlantic blacknose shark stock was overfished and experiencing overfishing, and the Gulf of Mexico blacknose shark stock status was unknown.

A Federal Register notice on May 29, 2012 (77 FR 31562), notified the public that NMFS was considering the addition of Gulf of Mexico blacktip sharks to Amendment 5. This addition was proposed because Gulf of Mexico blacktip sharks were undergoing a stock assessment as part of the SEDAR 29 process, and that process would be completed before Amendment 5 was finalized. Therefore, NMFS determined that the addition of Gulf of Mexico blacktip sharks to Amendment 5 would allow NMFS to address new scientific information in the timeliest manner and facilitate administrative efficiency by optimizing our resources. NMFS also expected that this addition would provide better clarity and communicate to the public any possible impacts of the rulemaking on shark fisheries by combining potential management measures resulting from recent shark stock assessments into fewer rulemakings. Since publication of the Federal Register notice announcing the intent to consider the addition of Gulf of Mexico blacktip sharks in Amendment 5, NMFS accepted the results of the stock assessment as final. The results indicated that the Gulf of Mexico blacktip shark stock was not overfished and overfishing is not occurring.

The Notice of Availability of the DEIS for Amendment 5 and the proposed rule published in the Federal Register on December 7, 2012 (77 FR 73029), and November 26, 2012 (77 FR 70552), respectively. The public comment period ended on February 12, 2013.

Decision to Split Amendment 5 into Amendments 5a and 5b

During the comment period, NMFS received significant public comments on the proposed dusky shark measures regarding the data sources used and the analyses of these data. NMFS also received many comments requesting consideration of approaches to dusky shark fishery management that were significantly different from those NMFS proposed and analyzed in the Amendment 5 proposed rule and DEIS. For example, commenters suggested exemptions to the proposed recreational minimum size increase that would protect dusky sharks but still allow landings of other sharks – such as blacktip sharks or "blue" sharks such as shortfin mako and thresher sharks – and other commenters suggested implementing gear restrictions instead of additional pelagic longline closures.

After reviewing all of the comments received, NMFS concluded that further analyses were needed for dusky shark measures and decided to conduct further analyses on those measures pertaining to dusky sharks in a separate FMP amendment, EIS, and proposed rule. NMFS announced its intent to split Amendment 5 into Amendments 5a and 5b on April 24, 2013 (78 FR 24148). Comments were accepted until May 24, 2013.

Amendment 5a to the 2006 Consolidated HMS FMP

The FMP amendment for non-dusky shark species (i.e., scalloped hammerhead, sandbar, blacknose, and Gulf of Mexico blacktip sharks) included in draft Amendment 5 was renamed "Amendment 5a," and continued to be developed into a final rule and FEIS. The final rule for Amendment 5a to the 2006 Consolidated HMS FMP (Amendment 5a) was published on July 3, 2014 (78 FR 4038) and finalized the shark measures from the November 2012 proposed rule to maintain rebuilding of sandbar sharks; end overfishing and rebuild scalloped hammerhead and Atlantic blacknose sharks; and establish a TAC and commercial quota and recreational measures for Gulf of Mexico blacknose and blacktip sharks (NMFS 2013a). The new management groups, commercial quotas, and quota linkages became effective on July 3, 2013. The new recreational minimum size limit for hammerhead (great, scalloped, and smooth) sharks of 78 inches fork length became effective on August 2, 2013.

Amendment 6 to the 2006 Consolidated HMS FMP

The final rule for Amendment 6 to the 2006 Consolidated HMS FMP (Amendment 6) was published on August 18, 2015 (80 FR 50073). Management measures in Amendment 6 were designed to respond to the problems facing Atlantic commercial shark fisheries, such as commercial landings that exceed the quotas, declining numbers of fishing permits since limited access was implemented, complex regulations, derby fishing conditions due to small quotas and short seasons, increasing numbers of regulatory discards, and declining market prices. The final action implemented modifications to retention limits for LCS, a new management boundary for SCS in the Atlantic region, sub-regional commercial quotas for LCS in the Gulf of Mexico region, modifications to quota linkages between blacknose and non-blacknose SCS in both the Atlantic and Gulf of Mexico regions, modifications to the TACs and commercial quotas for non-blacknose SCS in both the Atlantic and Gulf of Mexico regions, and modifications to vessel upgrading restrictions. As a result of these modifications to the commercial quotas and the creation of a management boundary in the Atlantic region, the non-blacknose SCS fisheries in the Gulf and Atlantic regions were re-opened.

Amendment 9 to the 2006 Consolidated HMS FMP

In Amendment 3, NMFS determined that smoothhound sharks were in need of federal conservation and management measures and that they would appropriately be included within the HMS-managed stocks. This determination was made based on the wide geographic distribution and range of smoothhound sharks and the Secretarial management authority over HMS, including "oceanic sharks," in the Magnuson-Stevens Act. The final rule implementing Amendment 3 published in June 2010 (75 FR 30484, June 1, 2010) and delayed the effective

date of the smoothhound shark management measures pending approval for the data collection under the Paperwork Reduction Act (PRA) by the Office of Management and Budget (OMB) and to provide time for implementation of a permit requirement, for NMFS to complete a BiOp under section 7 of the ESA, and for fishermen to change business practices, particularly as it related to keeping the fins attached to the carcass through offloading. OMB approved the PRA data collection in May of 2011 and NMFS met informally with smoothhound shark fishermen along the east coast in the fall of 2010.

In January 2011, the President signed the Shark Conservation Act of 2010 (SCA). The SCA requires that all sharks landed in the United States be landed with their fins naturally attached to the carcass, but included a limited exception for smooth dogfish (*Mustelus canis*). In August 2011, NMFS published a final rule regarding trawl gear (August 10, 2011, 76 FR 49368; HMS Trawl Rule). The HMS Trawl Rule, among other things, allowed for the retention of smoothhound sharks caught incidentally with trawl gear, provided that total smoothhound shark catch on board or offloaded does not exceed 25 percent of the total catch by weight. In November 2011, NMFS published a rule (76 FR 70064, November 10, 2011) that delayed the effective date for all smoothhound shark management measures in both Amendment 3 and the 2011 trawl rule indefinitely to provide time for NMFS to consider the smooth dogfish-specific provisions in the SCA and for NMFS to finalize a Biological Opinion on the federal actions in Amendment 3, among other things.

Amendment 9 to the 2006 Consolidated HMS FMP (Amendment 9) implemented management measures in the shark fisheries affecting fishermen who fish for smoothhound sharks (e.g., smooth dogfish, Florida smoothhound, and Gulf smoothhound) and fishermen who fish for sharks with gillnet gear. The final rule for Amendment 9 published on November 24, 2015 (80 FR 73128), and addressed a number of issues including: establishing an effective date for previously-adopted smoothhound shark management measures finalized in Amendment 3 and in the 2011 HMS Trawl Rule; adjusting the commercial quota for the smoothhound shark fishery; implementing the smooth dogfish-specific provisions of the SCA; implementing the 2012 Shark Biological Opinion; and implementing Atlantic shark gillnet vessel monitoring system requirements. The final measures in Amendment 9 were effective on March 15, 2016.

Shark Commercial Fishing Quotas and Seasons

Currently, commercial shark fishing quotas and seasons are established annually in a final rule. Quotas are generally adjusted based on over- and/or underharvests experienced during previous Atlantic commercial shark fishing seasons, and adaptive management measures are used to provide, to the extent practicable, fishing opportunities for commercial shark fishermen in all regions and areas to determine the opening dates. The final rule for the 2016 Atlantic shark commercial fishing season was published on December 1, 2015 (80 FR 74999). The proposed rule for the 2017 Atlantic shark commercial fishing season published on August 29, 2016 (81 FR 59167); the comment period closed on September 28, 2016.

3.1.2 International Shark Management

3.1.2.1 ICCAT Shark Measures

The International Convention for the Conservation of Atlantic Tunas was prepared and adopted at a Conference of Plenipotentiaries, signed in Rio de Janeiro, Brazil, in 1966. ICCAT recommendations are binding instruments for Contracting Parties, while ICCAT resolutions are non-binding and express the will of the Commission. All ICCAT recommendations and resolutions are available on the ICCAT website at http://www.iccat.es/en/. Under ATCA, NMFS has authority to promulgate regulations as necessary and appropriate to implement ICCAT measures. ICCAT generally manages tuna and tuna-like fisheries and bycatch in those fisheries but also conducts research and has adopted measures related to shark species caught within the Convention area that are associated with other ICCAT species.

The first binding measure passed by ICCAT specific to sharks was Recommendation 04-10, "Concerning the Conservation of Sharks Caught in Association with Fisheries Managed by ICCAT." Recommendation 04-10 included, among other measures: reporting of shark catch data by Contracting Parties, a ban on shark finning, research on gears and shark nursery areas, a request for Contracting Parties to live-release sharks that are caught incidentally, a review of management alternatives from the 2004 assessment on blue and shortfin mako sharks, and a commitment to conduct another stock assessment of selected pelagic shark species no later than 2007. ICCAT completed stock assessments for shortfin mako and blue sharks in 2004. This work included a review of their biology, a description of the fisheries, analyses of the state of the stocks and outlook, analyses of the effects of current regulations, and recommendations for statistics and research. The SCRS assessment indicated that the current biomass of North and South Atlantic blue sharks was above maximum sustainable yield ($B>B_{MSY}$); however, these results were conditional and based on assumptions that were made by the Committee. The assessment indicated that blue sharks were not overfished. This conclusion was conditional and based on limited landings data. The North Atlantic shortfin mako population had experienced some level of stock depletion, as suggested by the historical catch-per-unit-effort (CPUE) trend and model outputs. The stock may be below maximum sustainable yield ($B<B_{MSY}$), suggesting that the species may be overfished (SCRS, 2004). In 2005, the 2004 ICCAT recommendation was amended to include additional measures pertaining to pelagic sharks. Measures included a requirement for Contracting Parties that have not yet implemented the 2004 recommendation to reduce shortfin mako shark mortality, and annually report on their efforts to the Commission.

At the 2007 ICCAT annual meeting in Antalya, Turkey, ICCAT adopted a recommendation concerning pelagic sharks (07-06, "Supplemental Recommendation by ICCAT Concerning Sharks"). The recommendation directed the SCRS to conduct stock assessments and recommend management alternatives for porbeagle sharks, take appropriate measures to reduce fishing mortality in porbeagle and North Atlantic shortfin mako shark stocks, and implement research on pelagic shark species caught in the Convention area in order to identify potential nursery areas. It also required that Contracting Parties, Cooperating non-Contracting Parties, Entities and Fishing Entities submit Task I and II data for sharks in advance of the next SCRS assessment.

In 2008, an updated stock assessment for blue and shortfin mako sharks was conducted by ICCAT's SCRS. The SCRS determined that while the quantity and quality of the data available

for use in the stock assessment had improved since the 2004 assessment, they were still uninformative and did not provide a consistent signal to inform the models used in the 2008 assessment. The SCRS noted that if these data issues could not be resolved in the future, their ability to determine stock status for these and other species would continue to be uncertain. The SCRS assessed blue and shortfin mako sharks as three different stocks: North Atlantic, South Atlantic, and Mediterranean. However, the Mediterranean data was considered insufficient to conduct the quantitative assessments for these species. In the 2009 stock assessment for porbeagle sharks, both porbeagle stocks in the Northwest and Northeast Atlantic were estimated to be overfished, with the Northeastern stock being more highly depleted. In 2012, the SCRS conducted a stock assessment for shortfin mako sharks. The results indicated that both the North and South Atlantic stocks of shortfin mako sharks are healthy and the probability of overfishing is low. However, the high uncertainty in past catch estimates and deficiency of some important biological parameters, particularly for the Southern stock, are still obstacles for obtaining reliable estimates of current status of the stocks.

Since 2007, a number of ICCAT recommendations have been adopted relevant to Atlantic LCS and SCS, although ICCAT measures generally focus on sharks caught in association with ICCAT fisheries, rather than on directed shark fisheries given needed clarifications in the appropriate scope of the Convention. Such clarifications are underway through ICCAT's Convention Amendment Working Group. In 2010, ICCAT adopted ICCAT Recommendations 10-07 and 10-08, which prohibit the retention, transshipping, landing, storing, or selling of hammerhead sharks in the family *Sphyrnidae* (except for *Sphyrna tiburo*) and oceanic whitetip sharks (*Carcharhinus longimanus*) caught in association with ICCAT fisheries. At the 2011 meeting, ICCAT adopted Recommendation 11-08, which prohibits retention, transshipping, or landing of any part or whole carcass of silky shark (*Carcharhinus falciformis*) caught in association with ICCAT fisheries. In 2012, ICCAT adopted Recommendation 12-05, *Recommendation by ICCAT on Compliance with Existing Measures on Shark Conservation and Management,* which requires that Contracting Parties, Cooperating non- Contracting Parties, Entities, or Fishing Entities submit details on the implementation of and compliance with ICCAT shark conservation and management measures. In 2015, ICCAT adopted Recommendation 15-06, which requires that Contracting Parties, and Cooperating non-Contracting Parties, Entities or Fishing Entities shall require their vessels to promptly release unharmed, to the extent practicable, porbeagle sharks caught in association with ICCAT fisheries when brought alive alongside for taking on board the vessel.

3.1.2.2 Domestic Implementation of Recent ICCAT Shark Measures

NMFS published a final rule (76 FR 53652, August 29, 2011) that implemented ICCAT Recommendations 10-07 and 10-08, which prohibit the retention, transshipping, landing, storing or selling of hammerhead sharks in the family *Sphyrnidae* (except for bonnethead sharks, *Sphyrna tiburo*) and oceanic whitetip sharks (*Carcharhinus longimanus*) caught in association with fisheries managed by ICCAT. This final rule, which became effective on September 28, 2011, prohibits the retention of hammerhead and oceanic whitetip sharks by Atlantic HMS commercially-permitted vessels that have pelagic longline (PLL) gear on board, and recreational fishermen fishing with a General Category permit when participating in a HMS tournament or fishing under an HMS Angling or Charter/Headboat permit where tunas, swordfish, and/or billfish are also retained. Commercial shark bottom longline (BLL), gillnet, or handgear

fisheries, and shark recreational fisheries when tunas, swordfish, and billfish are not retained, were not impacted by this rule because they are not considered ICCAT fisheries (i.e., fisheries that target tunas, swordfish, and/or billfish) and thus can continue to retain oceanic whitetip and hammerhead sharks.

In 2012, NMFS published a final rule to implement ICCAT Recommendation 11-08, which prohibits retaining, transshipping, or landing silky sharks (*Carcharhinus falciformis*) caught in association with ICCAT fisheries (77 FR 60632, October 4, 2012). In order to facilitate domestic enforcement and compliance, NMFS also prohibited storing, selling, and purchasing the species, consistent with the similar regulations regarding oceanic whitetip and most hammerhead sharks. This rule prohibits retention of silky sharks by vessels with PLL gear onboard and also prohibits retention of silky sharks by vessels that are issued both an HMS Charter/Headboat permit and a commercial shark permit when tuna, swordfish, or billfish are on board the vessel.

In August 2016, NMFS published a final rule to implement ICCAT Recommendation 15-06 (81 FR 57803). Recommendation 15-06 requires fishing vessels to promptly release unharmed, to the extent practicable, porbeagle sharks caught in association with ICCAT fisheries when brought alive alongside for taking on board the vessel.

3.1.2.3 Domestic Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES)

CITES is an international treaty designed to control and regulate international trade of certain animal and plant species that are now or potentially may be threatened with extinction, and are affected by trade. These species are included in Appendices to CITES, which are available on the CITES Secretariat's website at http://www.cites.org/eng/app/appendices.php. Currently, 177 countries, including the United States, are Parties to CITES. The Convention calls for meetings of the Conference of the Parties, held every two to three years, at which the Parties review treaty implementation, make provisions enabling the CITES Secretariat in Switzerland to carry out its functions, consider amendments to the lists of species in Appendices I and II, consider reports presented by the Secretariat, and make recommendations for the improved effectiveness of CITES. Any country that is a Party to CITES may propose for these meetings amendments to Appendices I and II, and resolutions, decisions, and agenda items for consideration by all the Parties.

At the fifteenth regular meeting of the Conference of the Parties to CITES (CoP15) the United States submitted a proposal to include oceanic whitetip and hammerhead sharks (great, scalloped, and smooth hammerhead sharks) in Appendix II; however, the proposal was rejected. At the sixteenth regular meeting of the Conference of the Parties to CITES (CoP16) took place in March 2013, the United States again co-proposed listing oceanic whitetip sharks with Colombia and Brazil for Appendix II listing. This measure was adopted by consensus. At CoP16, Brazil, Costa Rica, Croatia, Denmark (on behalf of the European Union), Ecuador, Honduras, and Mexico also sponsored a proposal supported by the United States to list great, scalloped, and smooth hammerhead sharks on Appendix II; this proposal was also adopted. Thus, oceanic whitetip sharks, and great, scalloped, and smooth hammerhead sharks are now listed on Appendix II, which imposes certain trade-related requirements. This is in addition to basking

and whale sharks, both of which were added in 2003, and white sharks, which were added in 2005.

Appendix II includes species that are not currently threatened, but may become so without trade control. Regulated trade is allowed provided that the exporting country issues a permit based on findings that the specimens were legally acquired, and the trade will not be detrimental to the survival of the species or its role in the ecosystem. Once these listings go into effect, any U.S. fishermen or dealer who wishes to export oceanic whitetip sharks, great, scalloped, or smooth hammerhead sharks, or porbeagle sharks will have to obtain a CITES permit in order to export or re-export these products. Similar documentation is required in order to import any of the species on Appendix II, including basking, whale, and white sharks.

3.1.3 Existing State Regulations

Table 3.2 outlines the existing State regulations in Atlantic, Gulf of Mexico, and Caribbean states and territories, as of November 5, 2015, with regard to shark species. While the HMS Management Division updates this table periodically throughout the year, persons interested in the current regulations for any state should contact each state directly.

Table 3.2 State Rules and Regulations Pertaining to Atlantic Sharks, as of November 5, 2015. State regulations are subject to change. Please contact the appropriate state personnel to ensure that the regulations listed below are current. X = Regulations in Effect; n = Regulation Repealed; FL = Fork Length; CL = Carcass Length; TL = Total Length; LJFL = Lower Jaw Fork Length; CFL = Curved Fork Length; DW = Dressed Weight; and SCS = Small Coastal Sharks; LCS = Large Coastal Sharks. *Regulations, references, and contact information not confirmed by state before publication of 2015 SAFE Report (NMFS 2015c). Please see state resources for more information.

State	Cite Reference	Regulatory Details	Contact Information
ME	Sharks - Code ME R. 13-188 ' 50.01, 50.04 and 50.10	Sharks – Commercial harvest of sharks (except spiny dogfish) in state waters prohibited; finning prohibited; sharks harvested elsewhere but landed in Maine, or sharks landed recreationally, must be landed with head, fins, and tail naturally attached to the carcass; porbeagle cannot be landed commercially after federal quota closes. Dealers who purchase sharks must obtain a federal dealer permit. Recreational anglers must possess a federal HMS angling permits.	ME Department of Marine Resources Phone: (207) 624-6550 Fax: (207) 624-6024
NH	Sharks - FIS 603.20	Sharks – See list for prohibited sharks (http://gencourt.state.nh.us/rules/state_agencies/fis600.html) – no take, landings, or possession of prohibited shark species; NH Wholesale Marine Species License and a Federal Dealer permit required for all dealers purchasing listed sharks; Porbeagle sharks can only be taken by recreational fishing from state waters; Head, fins and tail must remain attached to all shark species through landing	NH Fish and Game Douglas Grout Phone: (603) 868-1095 Fax: (603) 868-3305

State	Cite Reference	Regulatory Details	Contact Information
MA	Sharks – 322 CMR 6.37	Sharks – ASMFC Coastal Shark Plan (no shark species may be landed with tails or fins removed 322 CMR 6.37(3)(d)) All MA commercial and recreational fishing regulations are available online at: http://www.mass.gov/dfwele/dmf/commercialfishing/cmr_index.htm	MA Division of Marine Fisheries Jared Silva Phone: (617) 626-1534 Fax: (617) 626-1509
RI*	Sharks - RIMFC Regulations part VII 7.24	Sharks – ASMFC Coastal Shark Plan RI commercial fishing license and/or landing permit required to harvest and/or land HMS All RI commercial and recreational marine fisheries regulations are available online at: http://www.dem.ri.gov/pubs/regs/regs/fishwild/rimftoc.htm RIMFC Regulations part VII 7.24 are available online at: http://www.dem.ri.gov/pubs/regs/regs/fishwild/rimf7.pdf	RI Dept. of Environment Management, Div. of Fish and Wildlife Eric Schneider Phone: (401) 423-1933
CT	Sharks – Regulations of Connecticut State Agencies § 26-159a-1; Connecticut General Statutes §26-102, Declaration 15-04	Sharks – Prohibited species same as federal regulations; Possession of sandbar shark (*Carcharhinus plumbeus*) prohibited except by permit for research and display purposes	CT Department of Energy and Environmental Protection David Simpson Phone: (860) 434-6043 Fax: (860) 434-6150
NY	Sharks - NY Environmental Conservation ' 13-0338; State of New York Codes, Rules and Regulations (Section 40.7)	Sharks – ASMFC Coastal Shark Plan; No person shall possess, sell, offer for sale, trade, or distribute a shark fin; provided, however, that this prohibition shall not apply to any shark fin that was taken from a spiny dogfish (*Squalus acanthias*) or a smooth dogfish (*Mustelus canis*) lawfully caught by a licensed commercial fisherman; a shark fin may be possessed by any person if the shark was lawfully caught and the person has a recreational marine fishing registration or a license or permit from the department for bona fide scientific research or educational purposes	NY Department of Environmental Conservation Stephen W. Heins Phone: (631) 444-0435 Fax: (631) 444-0449
NJ*	Sharks - NJ Administrative Code, Title 7. Department of Environmental Protection, NJAC 7:25-18.1 and 7:25-18.12(d)	Sharks – ASMFC Coastal Shark Plan	NJ Fish and Wildlife Russ Babb Phone: (609)748-2020 Fax: (609) 748-2032
DE*	Sharks - DE Code Regulations 3541	Sharks – ASMFC Coastal Shark Plan	DE Division of Fish and Wildlife John Clark Phone: (302) 739-9914

State	Cite Reference	Regulatory Details	Contact Information
MD	Sharks - Code of Maryland Regulations 08.02.12.03 and 08.02.22.01-.04	Sharks – Recreational catch required to be tagged; ASMFC Coastal Shark Plan; all recreationally harvested sharks must have heads, tails, and fins attached naturally to the carcass through landing; all commercially harvested sharks other than smoothhounds must have tails and fins attached naturally to carcass through landing; smoothhound sharks harvested commercially may have dorsal, pectoral and caudal fins removed (caudal fins may not exceed 4% of total dressed weight of smoothhound shark carcasses on board; dorsal and pectoral fins may not exceed 8% of total dressed weight of smoothhound shark carcasses on board)	MD Department of Natural Resources Gina Hunt Phone: (410) 260-8326
VA	Sharks - 4 VA Administrative Code 20-490-10	Sharks – ASMFC Coastal Shark Plan	VA Marine Ressources Commission Robert O'Reilly Phone: (757) 247-2247 Fax: (757) 247-2002
NC*	Sharks -NC Administrative Code title 15A, NCAC, 03M .0512 Compliance with Fishery Management Plans	Sharks - Director may impose restrictions for size, seasons, areas, quantity, etc. via proclamation; ASMFC Coastal Shark Plan; additionally: longline in the shark fishery shall not exceed 500 yds. or have more than 50 hooks	NC Division of Marine Fisheries Randy Gregory Phone: (252) 726-7021 Fax: (252) 726-0254
SC	Sharks -SC Code Ann. ' 50-5-2725, 2730	Sharks – Defer to federal regulations; Gillnets may not be used in the shark fishery in state waters; State permit required for shark fishing in state waters	SC Department of Natural Resources Wallace Jenkins Phone: (843) 953-9835 Fax: (843) 953-9386
GA	Sharks - GA Code Ann. ' 27-4-130.1; GA Comp. R. & Regs. ' 391-2-4-.04	Sharks – Commercial/Recreational: 1/person for sharks from the Small Shark Composite (bonnethead, Atlantic sharpnose, and spiny dogfish), min size 30" FL. All other sharks - 1 shark/person or boat, whichever is less, min size 54" FL. Hammerheads (great, scalloped and smooth)-1/person or boat, whichever is less, minimum size – 78" FL. Prohibited Species: same as federal, plus silky sharks; All species must be landed head and fins intact; Sharks may not be landed in Georgia if harvested using gillnets; ASMFC Coastal Shark Plan	GA Department of Natural Resources Carolyn Belcher Phone: (912) 264-7218 Fax: (912) 262-3143

State	Cite Reference	Regulatory Details	Contact Information
FL	Sharks - FL Administrative Code 68B-44	Sharks – Commercial/recreational: min size – 54" except no min. size on blacknose, blacktip, bonnethead, smooth dogfish, finetooth, Atlantic sharpnose; Commercial/recreational possession limit – 1 shark/person/day, max; 2 sharks/vessel on any vessel with 2 or more persons on board; Allowable gear – hook and line only; State waters close to commercial harvest when adjacent federal waters close; Federal permit required for commercial harvest, so federal regulations apply in state waters unless state regulations are more restrictive; Finning, removing heads and tails, and filleting prohibited (gutting allowed); Prohibited species same as federal regulations plus prohibition on harvest of spiny dogfish, lemon, sandbar, silky, tiger, great hammerhead, smooth hammerhead, and scalloped hammerhead sharks, direct and continuous transit through state waters to place of landing for spiny dogfish, lemon, sandbar, silky, tiger, great hammerhead, smooth hammerhead, and scalloped hammerhead sharks legally caught in federal waters is allowed.	FL Fish and Wildlife Conservation Commission Martha Bademan Phone: (850) 487-0554 Fax: (850) 487-4847
AL	Sharks - AL Administrative Code r.220-3-.30, r.220-3-.37, and r.220-2-.77	Sharks – Recreational: bag limit – 1 sharpnose/person/day and 1 bonnethead/person/day; no min size; great hammerhead, smooth hammerhead, scalloped hammerhead 1/person/day - 78" FL; all other sharks – 1/person/day; min size – 54" FL or 30" dressed; Commercial - no size limit and no possession limit on any non-prohibited species. Restrictions of chumming and shore-based angling if creating unsafe bathing conditions; Prohibited species: Atlantic angel, basking, bigeye sand tiger, bigeye sixgill, bigeye thresher, bignose, Caribbean reef, Caribbean sharpnose, dusky, Galapagos, largetooth sawfish, longfin mako, narrowtooth, night, sandtiger, smalltooth sawfish, smalltail, sevengill, sixgill, spotted eagle ray, whale, white sandbar (unless fisherman possess a federal shark research fishery permit), silky (unless fisherman possess a Federal Atlantic shark fisheries permit). Commercial-state waters close, by species, when federal season closes; no shark fishing on weekends, Memorial Day, Independence Day, or Labor Day; Regardless of open or closed season, gillnet fishermen targeting other fish may retain sharks with a dressed weight not exceeding 10% of total catch.	AL Department of Conservation and Natural Resources, Marine Resources Division Major Scott Bannon Phone: (251) 861 2882 www.outdooralabama.com

State	Cite Reference	Regulatory Details	Contact Information
LA	Sharks - LA Administrative Code Title 76, Pt. VII, Ch. 3, § 357	Sharks - Recreational: min size – 54" FL, except Atlantic sharpnose and bonnethead which have no size limit; bag limit - 1 sharpnose or bonnethead/person/day, all other sharks, except sandbar, silky and all prohibited sharks – 1 fish/person/day in aggregate including SCS, LCS, and pelagic sharks; Commercial: 36/vessel/day limit; no min size; Com & rec harvest prohibited: Apr 1 - Jun 30; Prohibited species: same as federal regulations; Fins must remain naturally attached to carcass though off-loading. Commercial shark fishing requires annual state shark permit. Owners/operators of vessels other than those taking sharks in compliance with state or federal commercial permits are restricted to no more than one shark from either the large coastal, small coastal, or pelagic group per vessel per trip within or without Louisiana waters.	LA Department of Wildlife and Fisheries Jason Adriance Phone: (504) 284-2032 or (225) 765-2889 Fax: (504) 284-5263 or (225) 765-2489
MS*	Tunas/Billfish/Sharks - MS Code Title-22 part 7	Sharks – Recreational min size: LCS/Pelagics 37" TL; SCS 25" TL; possession limit: LCS/Pelagics 1/person up to 3/vessel; SCS 4/person; Commercial and prohibited species same as federal regulations; Prohibition on finning	MS Department of Marine Resources Kerwin Cuevas Phone: (228) 374-5000
TX	Billfish/Swordfish/Sharks - TX Administrative Code Title 31, Part 2, Parks and Wildlife Code Title 5, Parks and Wildlife Proclamations 57.971, 57.973 and 57.981	Sharks - Commercial/recreational: bag limit - 1 shark/person/day; possession limit is twice the daily bag limit (i.e., 2 sharks/person/day); min size 24" TL for Atlantic sharpnose, blacktip, and bonnethead sharks and 64" TL for all other lawful sharks. Prohib. species: same as federal regulations	TX Parks & Wildlife Department Mark Lingo Phone: (512) 389-4668 Fax: (512) 389-8762
Puerto Rico	Regulation #7949 Article 13 – Commercial Fishing Limits Article 18 – Recreational Fishing Limits	Swordfish or billfish, tuna, and shark are covered under the federal Atlantic HMS regulations (50 CFR, Part 635), which also apply in territorial waters; Fishers who capture these species are required to comply with said regulation; billfish captured incidentally with long line must be released by cutting the line close to the fishhook, avoiding the removal of the fish from the water; in the case of tuna and swordfish, fishers shall obtain a permit according to the requirements of the federal government; Year-round closed season on nurse sharks.	Puerto Rico Department of Natural and Environmental Resources Craig Lilyestrom Phone: (787) 772-2022
U.S. Virgin Islands*	V.I.C., Title 12, Chapter 9A.	Federal regulations and federal permit requirements apply in territorial waters. http://caribbeanfmc.com/pdfs/FishersBooklet%202012-JULY%20Final.pdf	6291 Estate Nazareth St. Thomas, VI 00802 Phone: (340) 775-6762 45 Mars Hill Complex Frederiksted, St. Croix, VI 00840 Phone: (340) 773-1082

3.2 Status of the Stock

The thresholds used to determine the status of Atlantic HMS are presented in Figure 3.1. These thresholds are fully described in Chapter 3 of the 1999 FMP and Amendment 1 to the Billfish FMP. These thresholds were incorporated into the 2006 Consolidated HMS FMP and are based upon the thresholds described in a paper providing the technical guidance for implementing NS 1 of the Magnuson-Stevens Act (Restrepo et al., 1998).

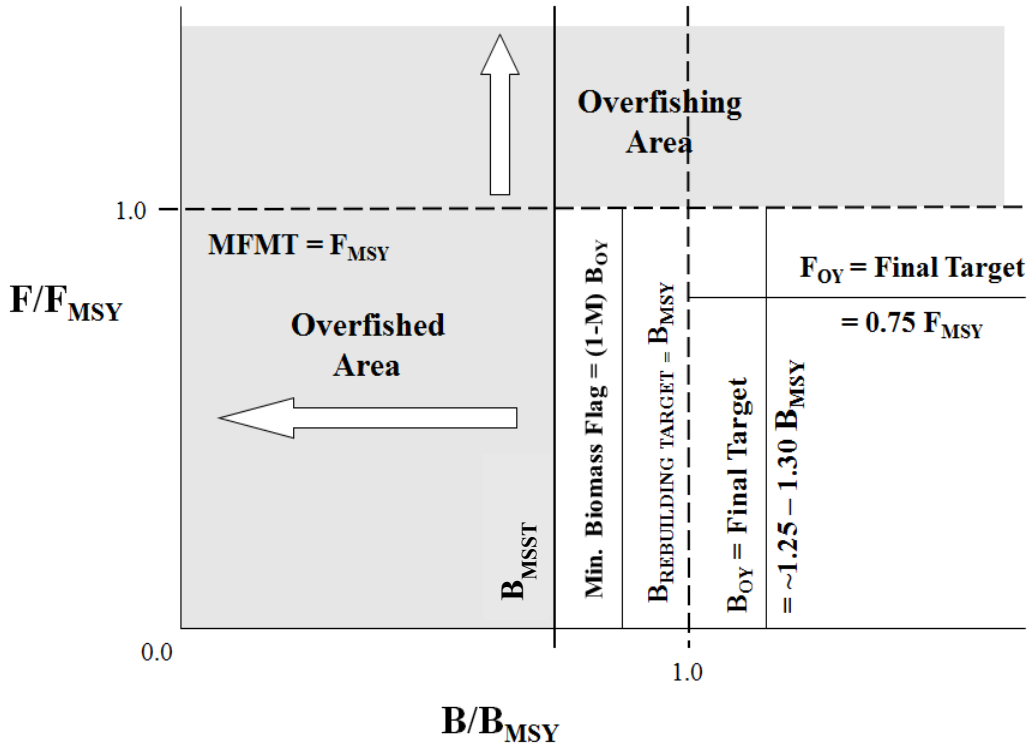

Figure 3.1 Illustration of the status determination and rebuilding terms.

In summary, a species is considered overfished when the current biomass (B) is less than the minimum stock size threshold ($B < B_{MSST}$). The minimum stock size threshold (MSST) is determined based on the natural mortality of the stock and the biomass at maximum sustainable yield (B_{MSY}). Maximum sustainable yield (MSY) is the maximum long-term average yield that can be produced by a stock on a continuing basis. The biomass can be lower than B_{MSY}, and the stock will not be declared overfished as long as the biomass is above B_{MSST}.

Overfishing may be occurring on a species if the current fishing mortality (F) is greater than the fishing mortality at MSY (F_{MSY}) ($F > F_{MSY}$). In the case of F, the maximum fishing mortality threshold (MFMT) is F_{MSY}. Thus, if F exceeds F_{MSY}, the stock is experiencing overfishing. If a species is declared overfished or has overfishing occurring, action to rebuild the stock and/or end overfishing is required by law. A species is considered to be rebuilt when B is equal to or greater than B_{MSY} and F is less than F_{MSY}. A species is considered healthy when B is greater than or

equal to the biomass at optimum yield (B_{OY}) and F is less than or equal to the fishing mortality at optimum yield (F_{OY}).

Atlantic shark stock assessments for large coastal sharks and small coastal sharks are generally completed by the Southeast Data, Assessment, and Review (SEDAR) process. All SEDAR reports are available at http://sedarweb.org/. ICCAT's SCRS has assessed blue, shortfin mako, and porbeagle sharks. All SCRS final stock assessment reports can be found at www.iccat.int/en/assess.htm. In some cases, NMFS also looks at available resources, including peer reviewed literature, for external assessments that, if deemed appropriate, could be used for domestic management purposes. NMFS followed this process in determining the stock status of scalloped hammerhead sharks based on an assessment for the sharks completed by Hayes et al. (2009).

Additional details on stock statuses for the large coastal Atlantic sharks can be found in Chapters 1 and 3 of Amendment 5a, Chapter 2 of the 2015 Stock Assessment and Fishery Evaluation (SAFE) Report (NMFS 2015c), as well as in the summary table below (Table 3.3).

In summary, the thresholds used to calculate the domestic status of Atlantic HMS, as described in the 1999 FMP and 2006 Consolidated HMS FMP (NMFS 2006a), are:

- MFMT = F_{limit} = F_{MSY};
- Overfishing is occurring when $F_{year} > F_{MSY}$;
- MSST = B_{limit} = (1-M)B_{MSY} when M < 0.5 = 0.5B_{MSY} when M >= 0.5;
- Overfished when $B_{year}/B_{MSY} <$ MSST;
- Biomass target during rebuilding = B_{MSY};
- Fishing mortality during rebuilding < F_{MSY};
- Fishing mortality for healthy stocks = 0.75F_{MSY};
- Biomass for healthy stocks = B_{OY} = ~1.25 to 1.30B_{MSY};
- Minimum biomass flag = (1-M)B_{OY}; and
- Level of certainty of *at least* 50 percent but depends on species and circumstances; for sharks, a level of certainty of 70 percent is often used as a guide.
- For sharks, in some cases, spawning stock fecundity (SSF) or spawning stock number (SSN) was used as a proxy for biomass since biomass does not influence pup production in sharks.

Table 3.3 Summary of stock assessment information and the current status of Atlantic LCS as of September 2016. **NMFS updates all U.S. fisheries stock statuses each quarter and provides a Status of U.S. Fisheries Report to Congress on an annual basis. The status of the stock reports are available at: http://www.nmfs.noaa.gov/sfa/fisheries_eco/status_of_fisheries/. * A value for B_{MSY} (or its proxy) was not provided in the stock assessment.**

Species	Current Relative Biomass Level	B_{MSY}	Minimum Stock Size Threshold	Current Relative Fishing Mortality Rate	Maximum Fishing Mortality Threshold	Outlook – From Status of Stocks for U.S.-Managed Species	Years to Rebuild	Rebuilding Start Date (Rebuilding End Date)
Large coastal shark complex	*Unknown*	*Unknown*	$(1\text{-}M)B_{MSY}$	*Unknown*	*Unknown*	*Unknown*		
Sandbar sharks	SSF_{2009}/SSF_{MSY} = 0.51 – 0.72	SSF_{MSY} = 349,330-1,377,800 (numbers of sharks)	301,821 – 1,190,419 (based on $SSF_{MSY)}$	F_{2009}/F_{MSY} = 0.29-2.62	0.004-0.06	Overfished; overfishing is not occurring	66	1/1/2005 (2070)
Atlantic blacktip sharks	*Unknown*	*Unknown*	$(1\text{-}M)B_{MSY}$	*Unknown*	*Unknown*	*Unknown*		
Gulf of Mexico blacktip sharks	SSF_{2010}/SSF_{MSY} = 2.00-2.66	SSF_{MSY} = 1,570,000 - 6,440,000 (numbers of sharks)	1,327,697 - 5,446,093 $(1\text{-}M)SSF_{MSY}$	F_{2010}/F_{MSY} = 0.05–0.27	0.021-0.163	Not overfished; overfishing is not occurring		
Dusky sharks	SSF_{2015}/SSF_{MSY} = 0.41-0.64	*Unknown**	$(1\text{-}M)SSB_{MSY}$	F_{2015}/F_{MSY} = 1.08 – 2.92	0.005-0.039	Overfished; overfishing is occurring	100	1/1/2008 (2107)
Scalloped hammerhead sharks	N_{2005}/N_{MSY} =0.45	N_{MSY} = 62,000 (numbers of sharks)	$(1\text{-}M)N_{MSY}$	F_{2005}/F_{MSY} =1.29	0.11	Overfished; overfishing is occurring	10	7/3/2013 (2023)

3.2.1 Dusky Sharks

3.2.1.1 Life History/Species Biology

Relative to other marine fish, sharks have a very low reproductive potential. Various factors determine this low reproductive rate: slow growth, late sexual maturity, one- to two-year reproductive cycles, a small number of young per brood, and specific requirements for nursery areas. These biological factors leave many species of sharks vulnerable to overfishing.

3.2.1.2 Stock Status

SEDAR is responsible for conducting stock assessments for the LCS and SCS complexes, although NMFS will adopt stock assessments from other sources when appropriate for management (e.g. Hayes, et al, 2009 scalloped hammerhead shark assessment). The SEDAR process is a cooperative process initiated in 2002 to improve the quality and reliability of fishery stock assessments in the South Atlantic, Gulf of Mexico, and U.S. Caribbean.

Dusky Sharks

Dusky sharks (*Carcharhinus obscurus)* off the U.S. East Coast were classified as a prohibited species in the 1999 FMP (NMFS 1999); this classification went into effect in 2000. Prior to that, they were managed in the LCS complex. In 1997, they were designated by NMFS as a candidate species for listing under the Endangered Species Act. In 2003, in Amendment 1 to the 1999 FMP (68 FR 74746), NMFS established a Mid-Atlantic closure to protect dusky sharks and juvenile sandbar sharks (NMFS 2003). NMFS closed this area to bottom longline fishing from January 1 through July 31 of every year, starting in January 2005, due in part to the high catch and mortality rates of dusky sharks on bottom longline gear in this area.

The first species-specific stock assessment for dusky sharks was conducted by the Southeast Fisheries Science Center in 2006. Length-frequency data and catch rate analyses suggested that the dusky stock was heavily exploited and on a declining trend. The estimated stock depletions were between 62 to 80 percent with respect to virgin biomass. Given the heavy fishing impact on this stock and high vulnerability to exploitation, assessment scientists recommended that rebuilding for dusky sharks could require 100 to 400 years. Based on these results, NMFS declared the status of dusky sharks as overfished with overfishing occurring (71 FR 65087, November 7, 2006). NMFS established a rebuilding plan for this species in July 2008 (with a rebuilding target of 2108) with Amendment 2 to the 2006 Consolidates HMS FMP (Amendment 2) (NMFS 2008a). Because dusky sharks were already prohibited, NMFS focused the Amendment 2 rebuilding plan towards reducing bycatch. The overall retention limits of non-sandbar LCS on all fishing vessels were reduced with the expectation that this action would in turn reduce incidental encounters with dusky sharks. Other measures included removing dusky sharks from the list of species allowed to be collected under display permits, not allowing similar-looking species to be retained by the recreational fishery, and maintaining the mid-Atlantic closed area.

The most recent benchmark assessment of dusky sharks was completed through the SEDAR process (76 FR 61092, October 3, 2011) in 2010 and 2011 (SEDAR 2011). SEDAR 21 was conducted using two face-to-face workshops and a series of webinars. The Data Workshop was a week-long face-to-face meeting, during which fisheries, monitoring, and life history data were

reviewed and compiled. The SEDAR 21 Data Workshop was held June 21-25, 2010, in Charleston, SC (May 4, 2010, 75 FR 23676). The Assessment Process was conducted via a series of webinars, during which assessment models were developed and population parameters were estimated using the information provided from the Data Workshop. Eighteen webinars were held between September 2010 and January 2011 (August 26, 2010, 75 FR 52510; October 12, 2010, 75 FR 62506; November 17, 2010, 75 FR 70216; December 16, 2010, 75 FR 78679). Finally, the Review Workshop was a week-long face-to-face meeting during which independent experts reviewed the input data, assessment methods, and assessment products. The Review Workshop for these assessments was held in Annapolis, MD, on April 18-22, 2011 (March 15, 2011, 76 FR 13985). All meetings were open to the public, and all materials from these meetings are available on the SEDAR website or upon request.

In each assessment, a base model was used to assess the individual populations. The base model for the 2010/2011 assessment used an age-structured catch-free production model and showed that dusky sharks continued to be overfished (spawning stock biomass $[SSB]_{2009}/SSB_{MSY}=0.44$) and were experiencing overfishing ($F_{2009}/F_{MSY}=1.59$). Because the model was "catch-free,"[5] it relied heavily on catch indices including fishery-dependent series (the commercial Bottom Longline Observer Program and Pelagic Longline Observer Program observer indices and the recreational Large Pelagic Survey) and fishery-independent series (Virginia Institute of Marine Science bottom longline survey and the NMFS Northeast pelagic longline survey). In addition, 19 sensitivity analyses were conducted during the assessment cycle for each assessment, which provided verification that the results of the assessment were robust to the assumptions about the underlying stock productivity and assumed levels of removal. The sensitivity runs modified which indices were used and some runs included indices that were not deemed robust. Two additional fishery-independent series were only recommended for sensitivity runs (University of North Carolina Longline and NMFS Historical Longline). Of these sensitivity runs, the Review Panel of the SEDAR 21 Review Panel Workshop selected which selected four sensitivity runs that represented plausible "states of nature" of the stocks and requested projections of these and the base model. Biomass (i.e., SSB) values from these selected sensitivity runs all indicated that the stock was overfished ($SSB_{2009}/SSB_{MSY}=0.41$-$0.50$). In addition, current F values from the selected sensitivity runs indicated that the stock was experiencing overfishing ($F_{2009}/F_{MSY}=1.39$-4.35).

The 2010/2011 SEDAR 21 benchmark assessment was updated in 2016 (as described in Section 1.2).

[5] Age-Structured Catch Free Models are used in stock assessments for fisheries where there is a high degree of uncertainty in reported catches, or catches are not reported at all, where stock assessment models that rely on catch data may not be appropriate. Underreporting (or mis-reporting as other species) of dusky sharks is likely to have occurred in the commercial fisheries because take of the species was prohibited effective in 2000. Dead discard estimates of dusky shark from the pelagic longline fishery are available as a result of the observer program. With such high uncertainty in the series of reported catch and discard, the catch-free methodology was selected as an appropriate application (SEDAR 2011).

3.3 Habitat

Section 303(a)(7) of the Magnuson-Stevens Act, 16 U.S.C. §§ 1801 *et seq*., requires FMPs to describe and identify essential fish habitat (EFH), minimize to the extent practicable adverse effects on such habitat caused by fishing, and identify other actions to encourage the conservation and enhancement of such habitat. The Magnuson-Stevens Act defines EFH as "those waters and substrate necessary to fish for spawning, breeding, feeding or growth to maturity." (16 U.S.C. § 1802 (10)). The EFH regulations (at 50 C.F.R. 600 Subpart J) provide additional interpretation of the definition of EFH:

> "Waters' include aquatic areas and their associated physical, chemical, and biological properties that are used by fish, and may include aquatic areas historically used by fish where appropriate; 'substrate' includes sediment, hard bottom, structures underlying the waters, and associated biological communities; 'necessary' means the habitat required to support a sustainable fishery and the managed species' contribution to a healthy ecosystem; and 'spawning, breeding, feeding, or growth to maturity' covers a species' full life cycle."

The EFH regulations require that EFH be described and identified within the U.S. EEZ for all life stages of each species in a fishery management unit. FMPs must describe EFH in text, tables, and figures that provide information on the biological requirements for each life history stage of the species. According to the EFH regulations, an initial inventory of available environmental and fisheries data sources should be undertaken to compile information necessary to describe and identify EFH and to identify major species-specific habitat data gaps. Habitats that satisfy the criteria in the Magnuson-Stevens Act have been identified and described as EFH in the 1999 FMPs and in Amendment 1 to the 1999 Tunas, Swordfish, and Shark FMP, and were updated in Amendment 1 to the 2006 Consolidated HMS FMP (NMFS 2008b).

NMFS originally described and identified EFH and related EFH regulatory elements for all HMS in the management unit in the 1999 FMPs, which were updated in Amendment 1 to the 1999 Tunas, Swordfish, and Shark FMP and implemented in 2003 (NMFS 1999; NMFS 2003). The EFH regulations require NMFS to conduct a comprehensive review of all EFH related information at least once every five years and revise or amend the EFH boundaries if warranted. To that effect, NMFS undertook the comprehensive five-year review of information pertaining to EFH for all HMS in the management unit in the 2006 Consolidated HMS FMP (NMFS 2006a). Based on the findings of this review, NMFS issued a Notice of Intent to amend EFH for HMS through Amendment 1 to the 2006 Consolidated HMS FMP (Amendment 1) on November 7, 2006 (71 FR 65087). In the Notice of Intent NMFS described its intent to prepare an Environmental Impact Statement (EIS) to examine alternatives for updating existing HMS EFH, consider additional Habitat Areas of Particular Concern (HAPCs), analyze fishing gear impacts, and if necessary, identify ways to avoid or minimize, to the extent practicable, adverse fishing impacts on EFH consistent with the Magnuson-Stevens Act and other relevant federal laws. At that time, NMFS requested new information not previously considered in the 2006 Consolidated HMS FMP, comments on potential HAPCs, and information regarding potential fishing and non-fishing impacts that may adversely affect EFH.

On June 12, 2009, NMFS published a Notice of Availability (74 FR 28018) of the Final EIS for Amendment 1 (NMFS 2008b). NMFS had completed the five year review and update of EFH for Atlantic HMS. Amendment 3 (June 1, 2010, 75 FR 30484) designated EFH for the smoothhound shark. As a result of Amendment 1, EFH was updated for all federally-managed Atlantic HMS (except for smoothhound sharks, which were not federally managed at this time). The amendment updated and revised EFH boundaries for HMS, designated a new HAPC, and analyzed fishing and non-fishing impacts on EFH. As described in Amendment 1, there is no evidence that physical effects caused by any authorized HMS gears (*i.e.*, handgear) are affecting EFH for targeted or non-targeted species, to the extent that physical effects can be identified on the habitat or the fisheries. As such, the actions analyzed in this EIS are not expected to increase gear impacts on any EFH beyond those impacts that have already been analyzed in Amendment 1 or any EFH designated by any other FMP for species in the U.S. Atlantic EEZ, which were described as not likely to have an effect on HMS or other managed species' EFH. Therefore, habitat effects will not be discussed further.

On July 1, 2015, NMFS announced the availability of the final EFH 5-Year Review and the Agency's intent to initiate an amendment to the 2006 Consolidated Atlantic HMS FMP to revise Atlantic HMS EFH descriptions and designations (80 FR 37598). The 5-Year Review determined that updates to Atlantic HMS EFH were warranted, and NMFS has developed Draft Amendment 10 to the 2006 Consolidated Atlantic HMS FMP (Amendment 10; NMFS 2016), which proposes updates to HMS EFH and modifies and/or considers new HAPCs, as appropriate. In addition to incorporating new literature discovered during the Final Atlantic HMS EFH 5-year Review, NMFS would also incorporate all newly available data collected since 2009 to ensure that the best available data would be analyzed for all HMS EFH designations under Draft Amendment 10 (81 FR 62100). EFH geographic boundaries would also be re-evaluated with new observer, survey, and tag/recapture data collected since 2009 even for species where there was limited or no new EFH data found during the 5-Year Review process.

EFH maps are presented in hard copy in Amendments 1 and 3 and electronically on the internet via spatial files in Adobe (.pdf) format. The electronic maps and downloadable spatial EFH files for HMS and all federally managed species are available on the NMFS EFH Mapper at: http://www.habitat.noaa.gov/protection/efh/habitatmapper.html. New proposed maps, including proposed updates to dusky EFH can be seen at http://www.nmfs.noaa.gov/sfa/hms/documents/fmp/am10/index.html.

3.3.1 Habitat Areas of Particular Concern

To further the conservation and enhancement of EFH, the EFH guidelines encourage FMPs to identify HAPCs. HAPCs are areas within EFH that meet one or more of the following criteria: they are ecologically important, particularly vulnerable to degradation, undergoing stress from development, or are a rare habitat type. HAPCs can be used to focus conservation efforts on specific habitat types that are particularly important to managed species. Currently, HAPCs have been designated for two HMS species: sandbar sharks and bluefin tuna. No HAPCs have been designated for dusky sharks. The areas off North Carolina, Delaware Bay, Chesapeake Bay, MD, and Great Bay, NJ, have been identified as HAPCs for sandbar sharks (NMFS 1999). The

sandbar shark HAPC serves as important nursing and pupping grounds. Under Draft Amendment 10, NMFS is considering modifying the current HAPC for sandbar shark along the Atlantic coast (specifically off the coast of the Outer Banks (NC), in Chesapeake Bay (VA), Delaware Bay (DE) and in the Mullica River-Great Bay system (NJ)) as the current sandbar shark HAPC does not overlap with the currently designated sandbar shark EFH.

A HAPC for bluefin tuna was designated in Amendment 1 to the 2006 Consolidated HMS FMP and is located across the western, northern, and central Gulf of Mexico. NMFS is currently considering changing the boundary of the existing bluefin tuna HAPC to encompass a larger area within the Gulf of Mexico under Draft Amendment 10. NMFS is also considering new HAPCs for lemon and sand tiger sharks under Draft Amendment 10. Specifically, NMFS has proposed a new HAPC for lemon sharks between Jupiter Inlet, FL and Cape Canaveral, FL, and two new HAPCs for sand tiger sharks in Delaware Bay and in coastal Massachusetts. Proposed maps of these HAPCs can be viewed at:
http://www.nmfs.noaa.gov/sfa/hms/documents/fmp/am10/index.html.

3.3.2 Habitat Types and Distributions

Sharks may be found in large expanses of the world's oceans, straddling jurisdictional boundaries. As many shark species are migratory, they are impacted by the condition of the habitats they occupy. Although many of the species frequent other oceans of the world, the Magnuson-Stevens Act only authorizes the description and identification of EFH in federal, state or territorial waters, including areas of the U.S. Caribbean, the Gulf of Mexico, and the Atlantic coast of the United States to the seaward limit of the Exclusive Economic Zone (EEZ). Despite the broad distribution of Atlantic sharks as adults, during the pupping season and throughout their neonate (newborn) life stages, which may vary from a few to several months, they may utilize specific estuaries as pupping and nursery areas.

Shark habitat can be described in four broad categories: (1) coastal, (2) pelagic, (3) coastal-pelagic, and (4) deep-dwelling. Coastal species inhabit estuaries, the nearshore and waters of the continental shelves, *e.g.*, blacktip, finetooth, bull, lemon, and Atlantic sharpnose sharks. Pelagic species, on the other hand, range widely in the upper zones of the oceans, often traveling over entire ocean basins. Examples include shortfin mako, blue, and oceanic whitetip sharks. Coastal-pelagic species are intermediate in that they occur both inshore and beyond the continental shelves, but have not demonstrated mid-ocean or transoceanic movements. Sandbar sharks are examples of a coastal-pelagic species. Deep-dwelling species, *e.g.*, most cat sharks (*Apristurus* spp.) and gulper sharks (*Centrophorus* spp.) inhabit the dark, cold waters of the continental slopes and deeper waters of the ocean basins. For a detailed description of shark coastal and estuarine habitat, continental shelf and slope area habitat, and pelagic habitat for the Atlantic, Gulf of Mexico, and U.S. Caribbean please refer to Chapter 6 of Draft Amendment 10 of 2006 Consolidated Atlantic HMS FMP (NMFS 2016).

3.4 Fishery Data Update

In this section, shark fishery data are analyzed by gear type. While shark fishermen generally target particular species, the non-selective nature of many fishing gears warrants analysis and

management on a gear-by-gear basis. In addition, issues such as bycatch and safety are generally better addressed by gear type.

The list of authorized fisheries and fishing gear became effective December 1, 1999 (64 FR 67511) and has been modified several times in subsequent final rules. The list applies to all U.S. marine fisheries, including Atlantic HMS. As stated in the rule, "no person or vessel may employ fishing gear or participate in a fishery in the EEZ not included in this List of Fisheries (LOF) without giving 90 days' advance notice to the appropriate Fishery Management Council (Council) or, with respect to Atlantic HMS, the Secretary of Commerce (Secretary)." Authorized gear types routinely used in Atlantic shark fisheries include:

- Pelagic longline fishery – longline (commercial)
- Shark gillnet fishery – gillnet (commercial)
- Shark bottom longline fishery – longline (commercial)
- Shark handgear fishery – rod and reel, handline, bandit gear (commercial)
- Shark recreational fishery – rod and reel, handline (recreational)

Below is an analysis of a subset of these gears, most pertinent to management measures mentioned in this document, including longline gear (pelagic and bottom) and gears utilized in the shark recreational fishery.

3.4.1 Pelagic Longline Fishery

3.4.1.1 Domestic History and Current Management

The pelagic longline (PLL) fishery for Atlantic HMS primarily targets swordfish, yellowfin tuna, and bigeye tuna in various areas and seasons. Secondary target species include dolphin, albacore tuna, and, to a lesser degree, sharks. Although this gear can be modified (e.g., depth of set, hook type, hook size, bait, etc.) to target swordfish, tunas, or sharks, it is generally a multi-species fishery. PLL vessel operators are opportunistic, switching gear style and making subtle changes to target the best available economic opportunity on each individual trip. PLL gear sometimes attracts and hooks non-target finfish with little or no commercial value as well as species that cannot be retained by commercial fishermen due to regulations, such as billfish. PLL gear may also interact with protected species such as marine mammals, sea turtles, and seabirds. Thus, this gear has been classified as a Category I fishery with respect to the Marine Mammal Protection Act (MMPA). Any species that cannot be landed due to fishery regulations (or undersized catch of permitted species) is required to be released, regardless of whether the catch is dead or alive.

PLL gear is composed of several parts (Figure 3.2). The primary fishing line, or mainline of the longline system, can vary from five to 40 miles in length, with approximately 20 to 30 hooks per mile. The depth of the mainline is determined by ocean currents and the length of the floatline, which connects the mainline to several buoys, and periodic markers which can have radar reflectors or radio beacons attached. Each individual hook is connected by a leader, or gangion, to the mainline. Lightsticks, which contain light emitting chemicals, are often used, particularly when targeting swordfish. When attached to the hook and suspended at a certain depth,

lightsticks attract baitfish, which may, in turn, attract pelagic predators (NMFS, 1999). The number of hooks per PLL set varies with line configuration and target species (Table 3.4).

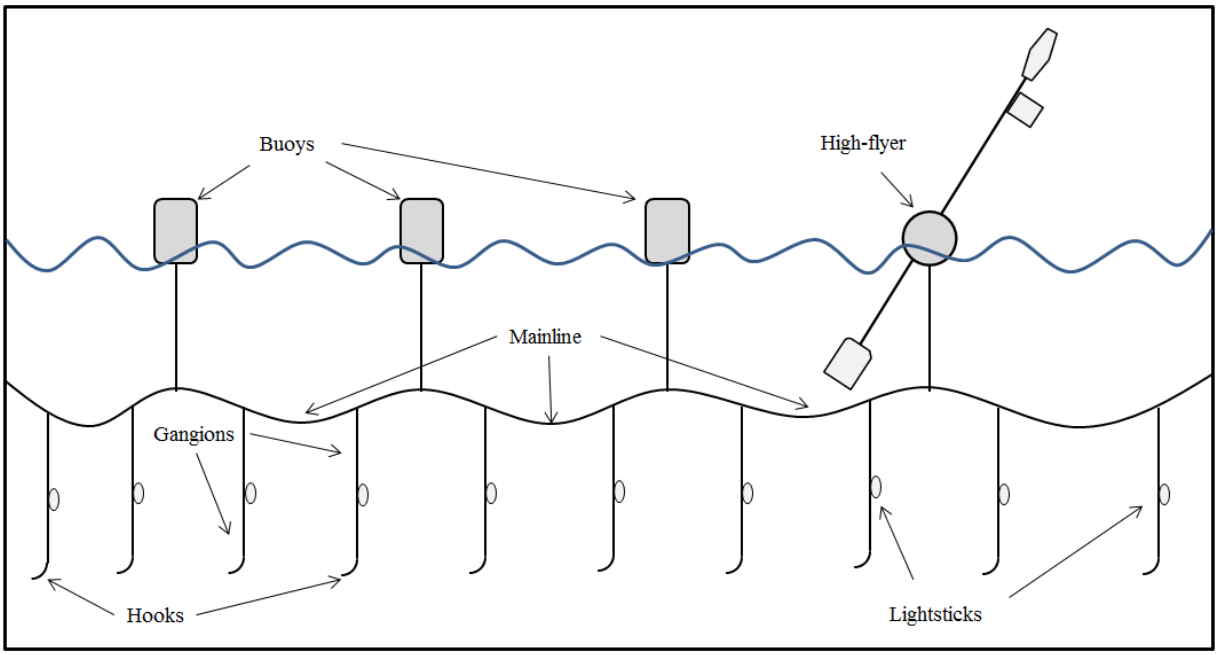

Figure 3.2 Typical U.S. Pelagic Longline Gear, as depicted in Arocha 1997.

Table 3.4 Average Number of Hooks per PLL Set: 2005 - 2015. Source: HMS Logbook.

Target Species	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Swordfish	747	742	672	708	687	759	728	683	735	780	729
Bigeye tuna	634	754	773	751	755	653	802	865	620	811	641
Yellowfin tuna	691	704	672	678	689	687	645	628	638	608	571
Mix of tuna species	692	676	640	747	744	837	786	728	694	670	653
Shark	542	509	494	377	354	455	348	525	NA	293	298
Dolphin	734	988	789	989	1,033	1,131	1,082	1,129	933	1,093	1,140
Other species	889	236	NA	NA	NA	467	400	300	NA	NA	150
Mix of species	786	777	757	749	781	761	749	758	717	722	737

Management of the U.S. Pelagic Longline Fishery

The U.S. Atlantic PLL fishery is restricted by a swordfish quota, divided between the North and South Atlantic (separated at 5°N. Lat.). Other regulations include minimum sizes for swordfish, yellowfin, bigeye, and bluefin tuna; an Individual Bluefin Quota (IBQ) program; shark quotas; protected species incidental take limits; reporting requirements (including logbooks); gear and bait requirements; limited access vessel permits, and mandatory workshop requirements. Current billfish regulations prohibit the retention of billfish by commercial vessels, or the sale of billfish from the Atlantic Ocean. As a result, all billfish hooked on PLL gear must be discarded, and are considered bycatch. PLL is a heavily managed gear type and, as such, is strictly

monitored. The final rule to implement Amendment 7 to the 2006 Consolidated HMS FMP (79 FR 71510, December 2, 2014) implemented mandatory electronic monitoring of PLL gear at haulback to monitor bluefin tuna bycatch and compliance with requirements of Amendment 7's Individual Bluefin Quota program requirements. Because it is difficult for PLL fishermen to avoid undersized or prohibited fish in some areas, NMFS has closed areas in the Gulf of Mexico, with particular regard to bluefin tuna spawning grounds there, and along the east coast. The intent of these closures is to decrease bycatch in the PLL fishery by closing those areas with the highest rates of bycatch. There are also time/area closures and gear restricted areas for PLL fishermen designed to reduce the incidental catch of bluefin tuna and sea turtles. In order to enforce time/area closures and to monitor the fishery, NMFS requires all PLL vessels to report positions on an approved VMS.

In addition to the regulations mentioned above, to protect sea turtles vessels with PLL gear onboard must, at all times, in all areas open to PLL fishing except the NED, possess onboard and/or use only 16/0 or larger non-offset circle hooks and/or 18/0 or larger circle hooks with an offset not to exceed 10 degrees. Only whole finfish and squid baits may be possessed and/or utilized with allowable hooks. Vessels fishing in the NED are required to use 18/0 or larger circle hooks with an offset not to exceed 10 degrees and whole mackerel or squid baits. All PLL vessels must possess and use sea turtle handling and release gear in compliance with NMFS careful release protocols. Additionally, all PLL vessel owners and operators must be certified in the use of the protected species handling and release gear. Certification must be renewed every three years and can be obtained by attending a training workshop. Approximately 18 - 24 workshops are conducted annually, and they are held in areas with significant numbers of PLL permit holders.

In 2009, to protect pilot whales and Risso's dolphins, the Pelagic Longline Take Reduction Plan (PLTRP) (74 FR 23349, May 19, 2009) included a requirement that PLL vessel operators fishing in the Cape Hatteras Special Research Area must contact NMFS at least 48 hours prior to a trip, and carry observers if requested. The PLTRP also established a 20 nm upper limit on mainline length for all PLL sets in the mid-Atlantic Bight (MAB), and required that an informational placard be displayed in the wheelhouse and on the working deck of all active PLL vessels in the Atlantic fishery.

In April 2011, NMFS implemented a requirement for PLL vessels to use "weak hooks" - hooks that are designed to release large bluefin tuna while retaining yellowfin tuna and swordfish – when fishing in the Gulf of Mexico (76 FR 18653, April 5, 2011). This action provides protection for spawning bluefin tuna in the Gulf of Mexico and helps to better align landings and dead discards of bluefin tuna with the Longline category bluefin tuna subquota.

Amendment 7 to the Consolidated Atlantic HMS FMP - Overview of Requirements for Pelagic Longline Vessels

Amendment 7 to the 2006 Consolidated HMS FMP was developed to reduce and account for bluefin tuna dead discards in all categories; optimize fishing opportunities in all categories within the United States' quota; enhance reporting and monitoring; and adjust other management measures. Four components of Amendment 7 affect the U.S. PLL fishery: (1) Two new or modified PLL Gear Restricted Areas (GRAs); (2) an Individual Bluefin Quota (IBQ) program;

(3) mandatory electronic monitoring of PLL gear at haulback; and (4) catch reporting of each PLL set using vessel monitoring systems (VMS). The conservation and management measures in Amendment 7 became effective January 1, 2015, with two exceptions: electronic monitoring requirements in the PLL fishery became effective on June 1, 2015, and trip level accountability requirements in the IBQ Program will become effective on January 1, 2016.

An important aspect of Amendment 7 is the IBQ Program, which requires vessels fishing with pelagic longline gear to account for all bluefin tuna either retained or discarded dead using quota available to the individual vessel, either through quota shares or leased quota through the IBQ system. This program is intended to reduce bluefin tuna dead discards by capping the amount of catch (landings and dead discards) by individual vessels; provide strong incentives to reduce interactions with bluefin and to increase flexibility for vessels to continue to operate profitably; accommodate different fishing practices within the pelagic longline fleet; and create new potential for revenue (from a market for leasable IBQ allocation).

Eligible Atlantic Tunas Longline permit holders have been issued an IBQ share, which is a percentage of the overall Longline quota ("quota share"), and are eligible to receive annual associated quota allocations. Shareholders as well as other permit holders that did not receive a quota share may lease additional quota from other participants to account for landings of bluefin and dead discards and to resolve quota debt that accumulates when incidental catch occurs without quota available to the vessel.

Amendment 7 also implemented mandatory electronic monitoring of PLL gear at haulback. To effect this requirement, NMFS paid for the installation and equipment costs for electronic monitoring systems on the vessels that received quota shares and for other vessels to the extent funding was available. Amendment 7 also requires vessels fishing with PLL gear to report through VMS the following information within 12 hours of completion of each PLL set: date the set was made; area in which the set was made; the number of hooks in the set; and the approximate length of all bluefin tuna retained, discarded dead, or released alive (by standardized size ranges). If a vessel is fishing both inside and outside of the Northeast Distant Area (NED) on the same trip, that vessel must submit two VMS bluefin catch reports noting the location of the catch. Permit holders must also submit a landing notification at least 3 hours, but no more than 12 hours, prior to any landing.

Additional information regarding requirements for PLL vessels is in the HMS Commercial Fishing Compliance Guide (http://www.nmfs.noaa.gov/sfa/hms/compliance/guides), and in the Amendment 7 Compliance Guide and IBQ Program FAQ documents (http://www.nmfs.noaa.gov/sfa/hms/documents/fmp/am7/index.html).

Permits

The 1999 FMP established six different limited access permit (LAP) types (NMFS 1999): (1) directed swordfish, (2) incidental swordfish, (3) swordfish handgear, (4) directed shark, (5) incidental shark, and (6) Atlantic tunas longline. To reduce bycatch in the PLL fishery, these permits were designed so that the swordfish directed and incidental permits are valid only if the permit holder also holds both a tuna longline and a shark permit. Similarly, the tuna longline

permit is valid only if the permit holder also holds both a swordfish (directed or incidental, not handgear) and a shark permit. This allows limited retention of species that might otherwise have been discarded.

As of November 2015, approximately 280 tuna longline LAPs had been issued. In addition, approximately 188 directed swordfish LAPs, 72 incidental swordfish LAPs, 224 directed shark LAPs, and 275 incidental shark LAPs had been issued (see Section 3.5 for more information on permits). Not all vessels with limited access swordfish and shark permits use PLL gear, but these are the only permits ((1) tuna longline; (2) shark LAP; and, (3) swordfish LAP (other than handgear)) that allow for the use of PLL gear in HMS fisheries.

In 2010, the procedures for issuing the Atlantic tunas longline permits were consolidated within the SERO permits office in St. Petersburg, Florida, where the shark and swordfish permits are also issued. This streamlined PLL permitting process has made it easier for fishermen to obtain combinations of permits, when necessary, and made it more efficient to administer.

Monitoring and Reporting

PLL fishermen and the dealers who purchase Atlantic HMS from them are subject to reporting requirements. NMFS has extended dealer reporting requirements to all swordfish importers as well as dealers who buy domestic swordfish from the Atlantic. These data are used to evaluate the impacts of harvesting on the stock and the impacts of regulations on affected entities.

Commercial HMS fisheries are monitored through a combination of vessel logbooks, dealer reports, port sampling, cooperative agreements with states, scientific observer coverage, electronic monitoring, and vessel monitoring systems. Logbooks contain information on fishing vessel activity, including dates of trips, number of sets, area fished, number of fish, and other marine species caught, released, and retained. In some cases, social and economic data, such as volume and cost of fishing input, are also required.

PLL Observer Program

During 2015, NMFS observers recorded 1,144 PLL sets for overall non-experimental fishery coverage of 14.0 percent (Garrison, pers. comm.). Table 3.5 details the amount of observer coverage in past years for this fleet.

The PLTRP (74 FR 23349, May 19, 2009) recommended that NMFS increase observer coverage to 12 to 15 percent throughout all Atlantic PLL fisheries that interact with pilot whales and Risso's dolphins to ensure representative sampling of fishing effort. If resources are not available to provide such observer coverage for all fisheries, regions, and seasons, the Pelagic Longline Take Reduction Team (PLTRT) recommended NMFS allocate observer coverage to fisheries, regions, and seasons with the highest observed or reported bycatch rates of pilot whales. The PLTRT recommended that additional coverage be achieved either by increasing the number of NMFS observers who have been specially trained to collect additional information supporting marine mammal research, or by designating and training special "marine mammal

observers'' to supplement traditional observer coverage. In 2015, total observer coverage, was 14.0 percent (Table 3.5).

NMFS increased mandatory observer coverage for pelagic longline vessels in the Mid-Atlantic Bight, including the Cape Hatteras Gear Restricted Area, from December 1, 2015 through April 30, 2016. Expanding observer coverage in this area will help scientists better understand bluefin tuna stock structure, biology and behavior, and assist in the rebuilding of the stock.

Table 3.5 Observer Coverage of the Pelagic Longline Fishery (1999 – 2015).

Year	Number of Sets Observed			Percentage of Total Number of Sets		
1999	420			3.8		
2000	464			4.2		
	Total	Non-NED	NED	Total	Non-NED	NED
2001[1]	584	398	186	5.4	3.7	100
2002[1]	856	353	503	8.9	3.9	100
2003[1]	1,088	552	536	11.5	6.2	100
	Total	Non-EXP	EXP	Total	Non-EXP	EXP
2004[2]	702	642	60	7.3	6.7	100
2005[2]	796	549	247	10.1	7.2	100
2006	568	-	-	7.5	-	-
2007	944	-	-	10.8	-	-
2008[3]	1,190	-	101	13.6	-	100
2009[3]	1,588	1,376	212	17.3	15	100
2010[3]	884	725	159	11	9.7	100
2011[3]	879	864	15	10.9	10.1	100
2012[4]	1,060	945	115	9.5	8.6	100
2013	1,528	1,474	54	14.4	14.1	100
2014	1,247	1,230	17	12.5	12.3	100
2015	1,144	-	-	14.0	-	-

NED – Northeast Distant Area; EXP – experimental. [1]In 2001, 2002, and 2003, 100 percent observer coverage was required in the NED research experiment. [2]In 2004 and 2005, there was 100 percent observer coverage in EXP. [3]In 2008- 2011, 100 percent observer coverage was required in experimental fishing in the FEC, Charleston Bump, and GOM, but these sets are not included in extrapolated bycatch estimates because they are not representative of normal fishing. [4]In 2012, 100 percent observer coverage was required in a cooperative research program in the GOM to test the effectiveness of "weak hooks" on target species and bycatch rates, but these sets are not included in extrapolated bycatch estimates because they are not representative of normal fishing. Sources: Yeung, 2001; Garrison, 2003b; Garrison and Richards, 2004; Garrison, 2005; Fairfield-Walsh and Garrison, 2006; Fairfield-Walsh & Garrison, 2007; Fairfield & Garrison, 2008; Garrison, Stokes & Fairfield, 2009; Garrison and Stokes, 2010, 2011, 2012, 2013, 2014; Garrison, pers. comm. 2015.

3.4.1.2 Recent Catch and Landings

U.S. Atlantic PLL catch (including bycatch, incidental catch, and target catch) is largely related to vessel characteristics and gear configuration. The reported catch, in numbers of fish, is summarized for the whole fishery in Table 3.6. Table 3.7 provides a summary of U.S. Atlantic PLL landings, as reported to ICCAT. Additional information regarding U.S. landings and discards is available in the 2015 U.S. National Report to ICCAT (NMFS 2015a).

Table 3.6 Reported Catch (Number of Fish) in the U.S. Atlantic Pelagic Longline Fishery (2006-2015). Source: HMS Logbook.

Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Swordfish kept	38,241	45,933	42,800	45,378	33,831	38,721	51,544	44,556	32,908	27,730
Swordfish discarded	8,900	11,823	11,194	7,484	6,107	8,736	7,996	4,756	4,655	5,382
Blue marlin discarded	439	611	687	1,013	504	544	896	844	718	990
White marlin discarded	557	744	670	1,064	605	943	1,432	1,239	1,580	2,855
Sailfish discarded	277	321	506	774	312	581	795	456	445	715
Spearfish discarded	142	147	197	335	212	281	270	342	306	837
Bluefin tuna kept	261	337	343	629	392	347	392	273	379	320
Bluefin tuna discarded	833	1,345	1,417	1,290	1,488	765	563	266	390	210
Bigeye, albacore, yellowfin, and skipjack tunas kept	73,058	70,390	50,108	57,461	51,786	69,504	84,707	67,083	73,339	54,734
Pelagic sharks kept	2,098	3,504	3,500	3,060	3,872	3,732	2,794	3,384	3,804	2,208
Pelagic sharks discarded	24,113	27,478	28,786	33,721	45,511	43,806	23,038	28,151	38,496	45,082
Large coastal sharks kept	1,768	546	115	403	434	131	86	49	47	50
Large coastal sharks discarded	5,326	7,133	6,732	6,672	6,726	6,351	7,716	7,997	5,905	8,839
Dolphin kept	25,658	68,124	43,511	62,701	30,454	30,054	42,445	34,250	63,217	53,526
Wahoo kept	3,608	3,073	2,571	2,648	749	1,922	3,121	2,721	3,325	1,563
Sea turtle interactions	128	300	476	137	94	66	61	92	93	357
Number of Hooks(×1k)	5,662	6,291	6,498	6,979	5,729	6,035	7,679	7,306	7,125	5,856

Table 3.7 Reported Landings (mt ww) in the U.S. Atlantic Pelagic Longline Fishery (2006-2014). Source: NMFS 2015a.

Species	2006	2007	2008	2009	2010	2011	2012	2013	2014
Yellowfin tuna	2,009.9	2,394.5	1,324.5	1,700.1	1,188.8	1,458.3	2,269.6	1,544.4	1,456.2
Skipjack tuna	0.2	0.02	1.45	0.5	1.4	0.6	0.4	0.5	0.31
Bigeye tuna	520.6	380.7	407.7	430.1	443.2	600.2	581.4	508.9	586.7
Bluefin tuna*	204.6	164.3	232.6	335.0	238.7	241.4	295.4	190.4	221.9
Albacore tuna	102.9	126.8	126.5	158.3	159.9	240.0	261.2	255.3	309.6
Swordfish N.*	1,960.8	2,474.0	2,353.6	2,691.3	2,206.5	2,570.9	3,346.6	2,812.1	1,832.3
Swordfish S.*	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.06	0.0

* Includes landings and estimated discards from scientific observer and logbook sampling programs.

At this point in time, the direct use of observer data, rather than self-reported HMS logbooks, with pooling for estimating dead discards in the PLL fishery represents the best scientific information available for use in stock assessments. Direct use of observer data has been employed for a number of years to estimate dead discards in Atlantic and Pacific longline fisheries, including billfish, sharks, and undersized swordfish. Furthermore, the data have been used for scientific analyses by both ICCAT and the Inter-American Tropical Tuna Commission for a number of years.

Bycatch

Bycatch mortality of marlins, sailfish, swordfish, and bluefin tuna from all fishing nations may significantly reduce the ability of these populations to rebuild, and it remains an important management issue. In order to minimize bycatch and bycatch mortality in the domestic PLL fishery, NMFS implemented regulations to close certain areas to this gear type and has banned the use of live bait by PLL vessels in the Gulf of Mexico.

Other species including marine mammals, turtles, seabirds, and finfish are occasionally hooked by pelagic longline vessels. For detailed descriptions of interactions with these species, please refer to Chapter 3 of Amendment 7 to the 2006 Consolidated HMS FMP and to HMS SAFE Reports.

Dusky Shark Interaction and Discard Hotspots

NMFS has analyzed HMS logbook data (2008-2014) to identify areas where a disproportionate number of dusky shark interactions and discards were occurring in the pelagic longline fishery. The regions selected during this analysis are the focus of dusky shark hotspot closure Alternative B4 presented in Chapter 4.0. The hotspot areas identified are in Charleston Bump (in May and November), Hatteras Shelf, Canyons, and Southern Georges Bank. Dusky shark interactions, dusky sharks discarded alive, and discarded dead are presented by year and month (Table 3.8, Table 3.9, Table 3.10, Table 3.11, and Table 3.12).

Numbers of dusky shark interactions reported in the HMS logbook declined in recent years (2013 and 2014) (Table 3.8). Dusky shark interactions and discards are highest in the Charleston Bump May Hotspot and the Hatteras Shelf Hotspot. Total pelagic longline dusky shark interactions from 2008 through 2014 (Table 3.8), as well as total number of hooks (Figure 3.4) and total number of sets (Figure 3.5) in that time period, are shown with the dusky shark hotspot closures considered in Alternative B4.

HMS Logbook and PLL Observer Program data show that a small number of vessels make up the majority of dusky shark interactions in the PLL fishery (Figure 3.6 and Figure 3.7).

Table 3.8 Dusky shark interactions, live and dead, reported in the pelagic longline fishery by year in areas considered for dusky shark hotspot closures (2008-2014). Source: HMS Logbook.

Dusky Shark Interactions by Area	Charleston Bump May Hotspot (Alt. B4a)	Charleston Bump Nov Hotspot (Alt. B4h)	Hatteras Shelf Hotspot (Alts. B4b, B4c, B4d)	Canyons Hotspot (Alt. B4e)	Southern Georges Bank Hotspot (Alts. B4f, B4g)	Total (Hotspots Only, Alts. B4a – B4g)	Total (All Reported Interactions)
2008	54	34	23	33	97	241	401
2009	198	155	86	68	65	572	624
2010	134	31	280	54	85	534	737
2011	51	24	41	10	37	163	547
2012	17	12	200	55	2	286	906
2013	96	42	9	1	3	151	394
2014	48	28	11	2	0	89	163
Total	598	326	650	223	289	2086	3772

Table 3.9 Total dusky shark interactions, live and dead, reported in the pelagic longline fishery by month in areas considered for dusky shark hotspot closures (2008-2014 combined). Source: HMS Logbook.

Dusky Shark Interactions by Area	Charleston Bump May Hotspot (Alt. B4a)	Charleston Bump Nov Hotspot (Alt. B4h)	Hatteras Shelf Hotspot (Alts. B4b, B4c, B4d)	Canyons Hotspot (Alt. B4e)	Southern Georges Bank Hotspot (Alts. B4f, B4g)	Total (Hotspots Only, Alts. B4a – B4g)	Total (All Reported Interactions)
January	27	11	1	0	0	39	92
February	0	0	0	0	0	0	87
March	2	2	4	0	0	8	350
April	1	0	0	0	0	1	156
May	360	164	19	0	0	543	815
June	36	15	425	4	7	487	992
July	12	9	32	20	131	204	352
August	23	14	30	54	85	206	257
September	5	1	13	15	65	99	176
October	39	32	28	124	1	224	243
November	65	62	98	5	0	230	199

December	28	16	0	1	0	45	53
Total	598	326	650	223	289	2086	3772

Table 3.10 Total numbers of self-reported dusky sharks discarded alive in the pelagic longline fishery by year in areas considered for dusky shark hotspot closures (2008-2014). Source: HMS Logbook.

Dusky Sharks Discarded Alive by Area	Charleston Bump May Hotspot (Alt. B4a)	Charleston Bump Nov Hotspot (Alt. B4h)	Hatteras Shelf Hotspot (Alts. B4b, B4c, B4d)	Canyons Hotspot (Alt. B4e)	Southern Georges Bank Hotspot (Alts. B4f, B4g)	Total (Hotspots Only, Alts. B4a – B4g)	Total (All Reported Discarded Alive)
2008	52	34	17	33	88	224	360
2009	166	130	76	64	63	499	556
2010	133	30	273	53	85	574	705
2011	51	24	41	10	36	162	535
2012	16	11	193	53	2	275	791
2013	83	35	6	1	3	128	356
2014	44	24	9	2	0	79	152
Total	545	288	615	216	277	1941	3452

Table 3.11 Total numbers of self-reported dusky sharks discarded dead in the pelagic longline fishery by year in areas considered for dusky shark hotspot closures (2008-2014). Source: HMS Logbook.

Dusky Sharks Discarded Dead by Area	Charleston Bump May Hotspot (Alt. B4a)	Charleston Bump Nov Hotspot (Alt. B4h)	Hatteras Shelf Hotspot (Alts. B4b, B4c, B4d)	Canyons Hotspot (Alt. B4e)	Southern Georges Bank Hotspot (Alts. B4f, B4g)	Total (Hotspots Only, Alts. B4a – B4g)	Total (All Reported Discarded Dead)
2008	2	0	4	0	9	15	36
2009	32	25	10	4	2	73	68
2010	1	1	7	1	0	10	35
2011	0	0	0	0	1	1	12
2012	1	1	7	2	0	11	114
2013	13	7	3	0	0	23	38
2014	4	4	2	0	0	10	11
Total	53	38	33	7	12	143	314

Table 3.12 Total numbers of self-reported dusky sharks discarded dead in the pelagic longline fishery by month in areas considered for dusky shark hotspot closures (2008-2014). Source: HMS Logbook.

Dusky Sharks Discarded Dead by Area	Charleston Bump May Hotspot (Alt. B4a)	Charleston Bump Nov Hotspot (Alt. B4h)	Hatteras Shelf Hotspot (Alts. B4b, B4c, B4d)	Canyons Hotspot (Alt. B4e)	Southern Georges Bank Hotspot (Alts. B4f, B4g)	Total (Hotspots Only, Alts. B4a – B4g)	Total (All Reported Discarded Dead)
January	0	0	0	0	0	0	7
February	0	0	0	0	0	0	7
March	0	0	0	0	0	0	61
April	0	0	0	0	0	0	11
May	47	33	9	0	0	89	115
June	0	0	6	0	1	7	50
July	0	0	0	0	4	4	10
August	0	0	3	0	2	5	10
September	0	0	0	2	5	7	8
October	5	5	3	5	0	18	13
November	0	0	12	0	0	12	18
December	1	0	0	0	0	1	4
Total	53	38	33	7	12	143	314

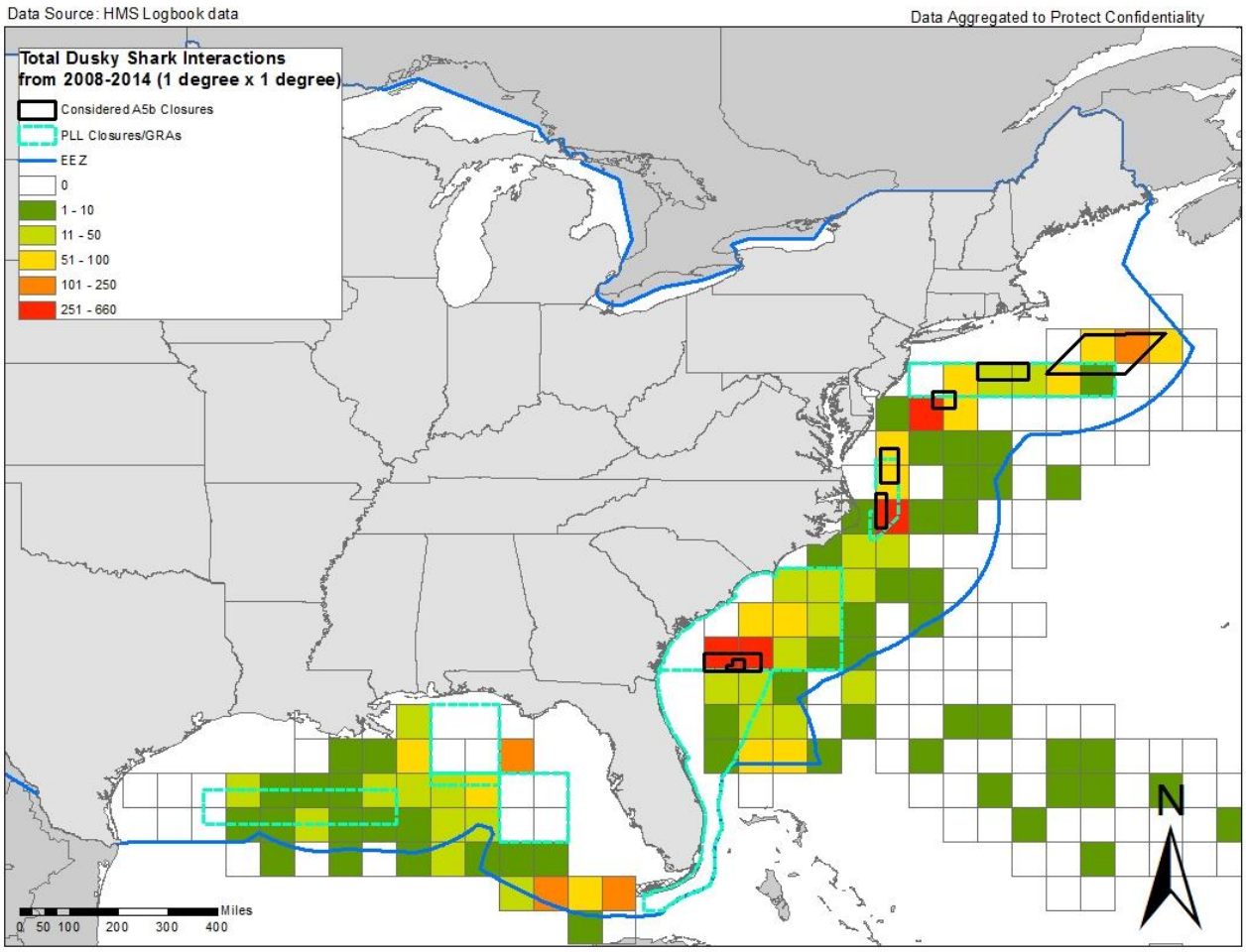

Figure 3.3 Total dusky shark interactions in the pelagic longline fishery (2008-2014). Dusky shark hotspot closure areas for HMS vessels fishing with pelagic longline gear considered in Alternative B4 outlined in black.

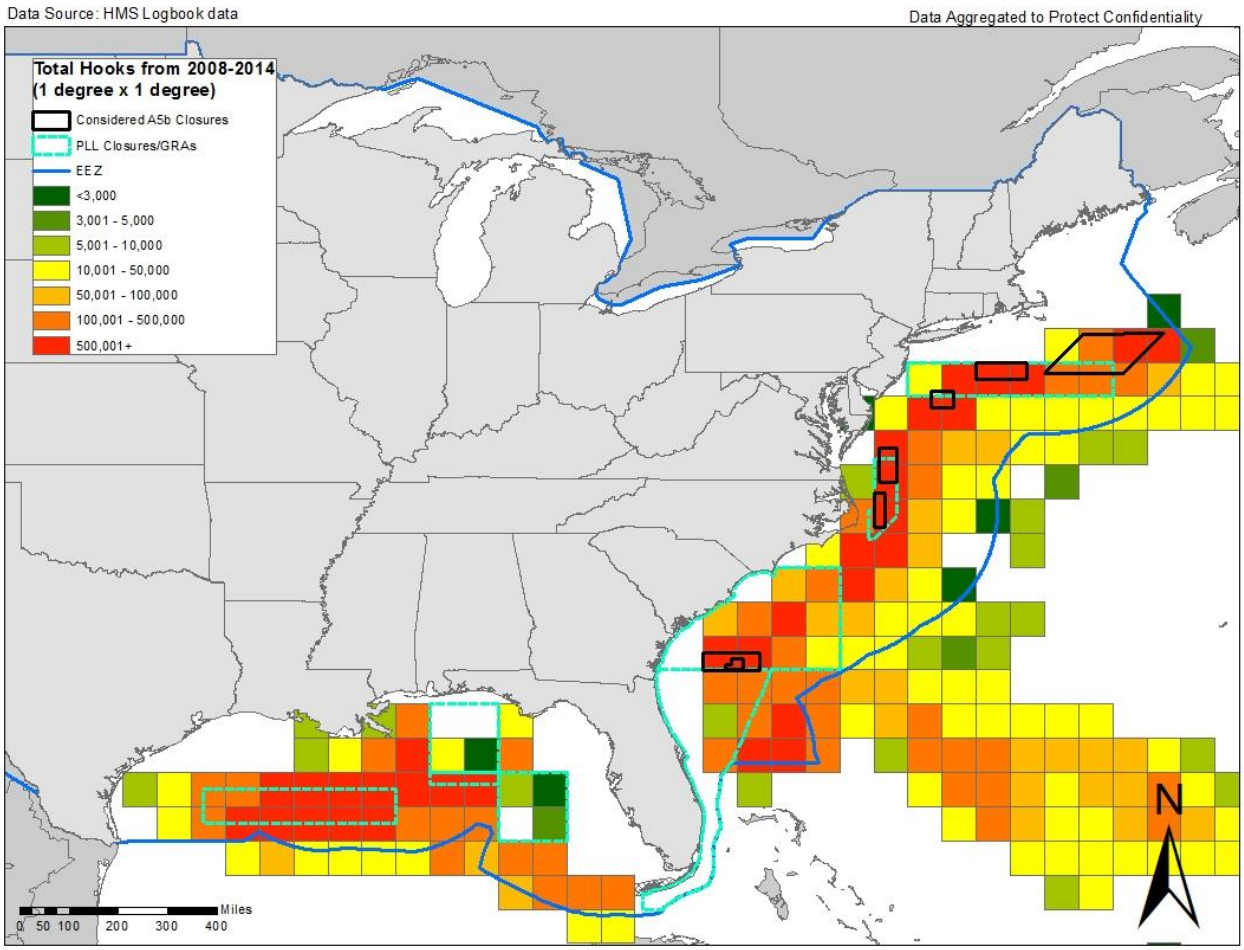

Figure 3.4 Total number of hooks in the pelagic longline fishery (2008-2014). Dusky shark hotspot closure areas for HMS vessels fishing with pelagic longline gear considered in Alternative B4 outlined in black.

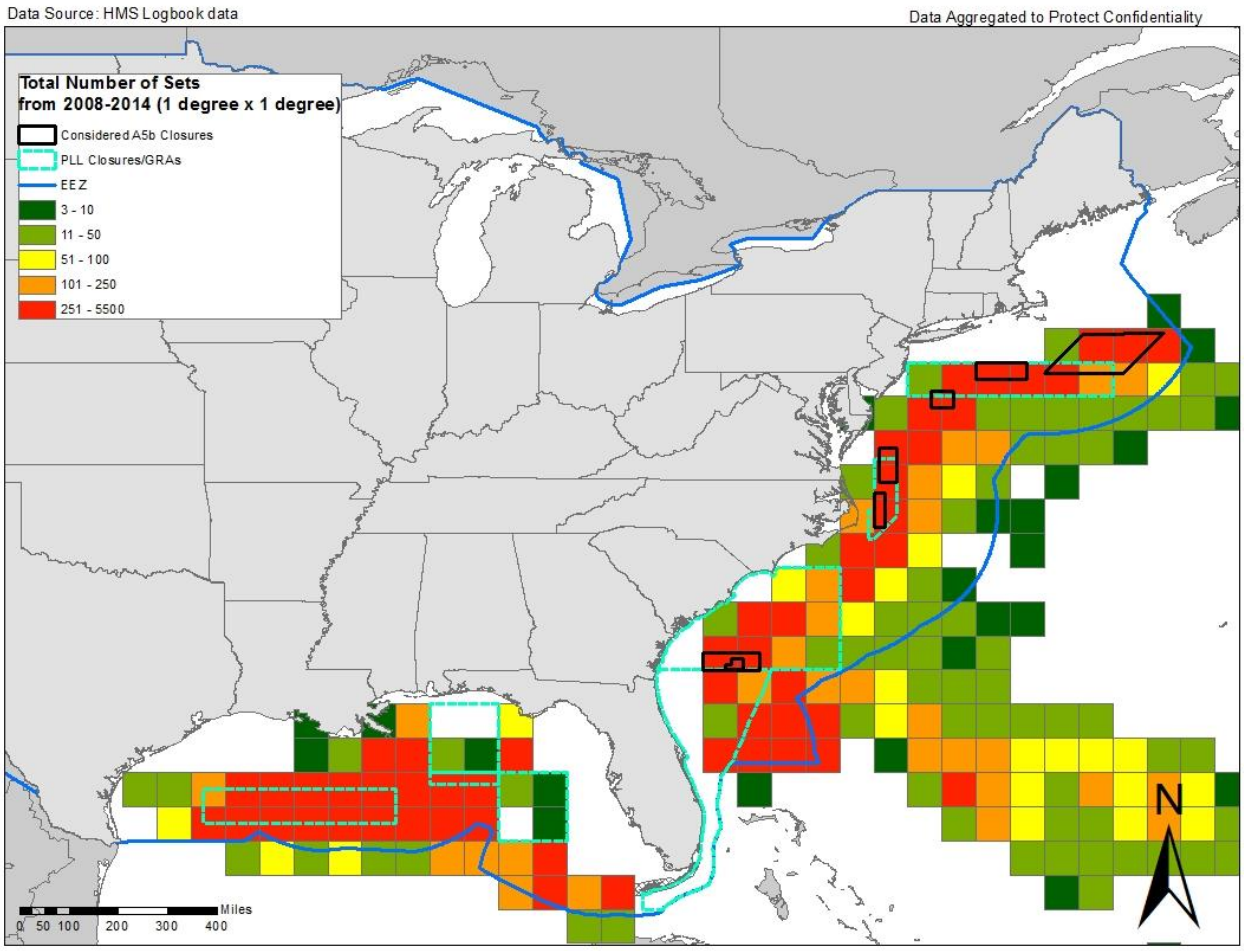

Figure 3.5 Total number of sets in the pelagic longline fishery (2008-2014). Dusky shark hotspot closure areas for HMS vessels fishing with pelagic longline gear considered in Alternative B4 outlined in black.

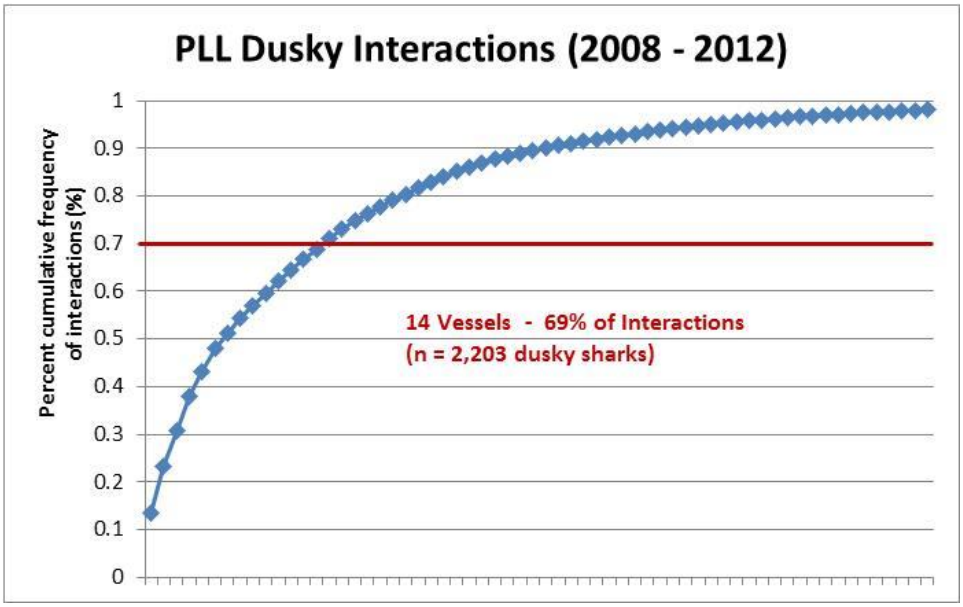

Figure 3.6 Percent contribution of individual vessels towards total dusky shark interactions, based on self-reported logbook data. Data Source: HMS Logbook, 2008-2012.

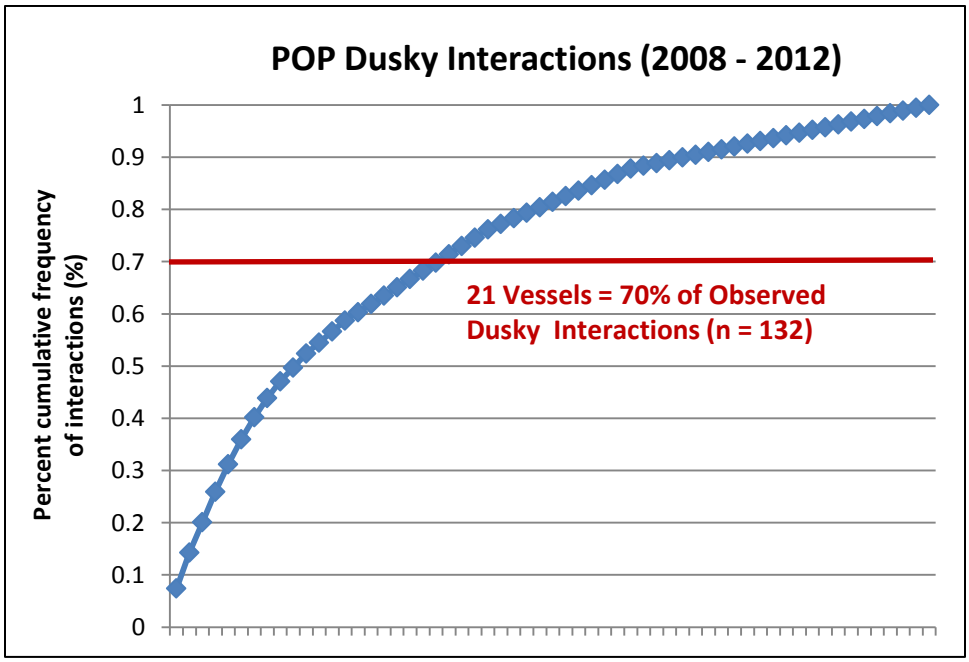

Figure 3.7 Percent contribution of individual vessels towards total dusky interactions, based on observer data. Data Source: NMFS Pelagic Observer Program data, 2008 - 2012.

3.4.1.3 Safety Issues

Like all offshore fisheries, pelagic longline fishing can be dangerous. Trips are often Long., the work is arduous, and the nature of setting and hauling longline gear may result in injury or death. Like all other HMS fisheries, longline fishermen are exposed to unpredictable weather. NMFS does not wish to exacerbate unsafe conditions through the implementation of regulations. Therefore, NMFS considers safety factors when implementing management measures in the PLL fishery. For example, all time/area closures are expected to be closed to fishing, not transiting, in order to allow fishermen to make a direct route to and from fishing grounds. NMFS seeks comments from fishermen on any safety concerns they may have. Fishermen have pointed out that, due to decreasing profit margins, they may fish with less crew or less experienced crew or may not have the time or money to complete necessary maintenance tasks. NMFS encourages fishermen to be responsible in fishing and maintenance activities.

3.4.1.4 International Issues and Catch

PLL fisheries for Atlantic HMS primarily target swordfish and tunas. Directed PLL fisheries in the Atlantic have been operated by Spain, the United States, and Canada since the late 1950s or early 1960s. The Japanese PLL tuna fishery started in 1956 and has operated throughout the Atlantic since then (NMFS, 1999). Many of the 50 other ICCAT parties now also operate PLL vessels. A detailed description of how ICCAT collects fishery data can be found in the 2015 SAFE Report (NMFS 2015c).

The U.S. PLL fleet represents a small fraction of the international PLL fleet that competes on the high seas for catches of tunas and swordfish. In recent years, the proportion of U.S. PLL landings of HMS, for the fisheries in which the United States participates, has remained relatively stable in proportion to international landings. Historically, the U.S. fleet has accounted for less than 0.5 percent of the landings of swordfish and tuna from the Atlantic Ocean south of 5° N. Lat. and does not operate at all in the Mediterranean Sea. Tuna and swordfish landings by foreign fleets operating in the tropical Atlantic and Mediterranean are greater than the catches from the north Atlantic area where the U.S. fleet operates. Within the area where the U.S. longline fleet operates, U.S. longline landings still represent a limited fraction of total landings. In recent years (2005-2014), U.S. longline landings have averaged 5.3 percent of total Atlantic longline landings, ranging from a high of 7.0 percent in 2012 to a low of 4.3 percent in 2010. Estimated international longline landings of HMS can be found in Section 4.1.2 of the 2015 SAFE Report (NMFS 2015c).

3.4.2 Recreational Handgear

The following section describes the recreational portion of the handgear fishery, and is primarily focused upon rod and reel fishing. The HMS Handgear (rod and reel, handline, buoy gear, and harpoon) fishery includes both commercial and recreational fisheries and is described fully in Section 2.5.8 of the 1999 FMP and 2006 Consolidated HMS FMP (NMFS 1999; NMFS 2006a) and in HMS SAFE Reports.

3.4.2.1 Overview of History and Current Management

Most Atlantic HMS are targeted by domestic recreational fishermen using a variety of handgear including rod and reel gear. Recreational fishing for any HMS-managed species requires an

HMS Angling permit or, for-hire vessels taking passengers recreational fishing, an HMS Charter/Headboat permit (note that for Atlantic tunas, the HMS Charter/Headboat permit also allows for sale of the tunas). Two otherwise commercial permits, the General Commercial Swordfish permit and the Atlantic Tunas General permit, also authorize vessel occupants to fish recreationally for all HMS, but only in registered Atlantic HMS tournaments. All HMS fishing tournaments are required to register with NMFS at least four weeks prior to the commencement of tournament fishing activities. If selected, tournament operators are required to report the results of their tournament to the NMFS Southeast Fisheries Science Center. For more information on recreational HMS handgear fisheries, please see the 2006 Consolidated HMS FMP (NMFS 2006a) and HMS SAFE Reports.

The recreational shark fishery is managed using bag limits, minimum size requirements, and landing requirements (sharks must be landed with head and fins naturally attached). Additionally, there are 21 species of sharks of which recreational fishermen are prohibited from possessing or landing. Recreational fishermen are allowed to keep non-ridgeback LCSs, tiger sharks, pelagic sharks, SCSs, and smoothhound sharks. As of July 24, 2008, recreational fishermen were prohibited from keeping sandbar or silky sharks.

3.4.2.2 Recent Catch and Landings Data

The recreational landings database for Atlantic sharks consists of information obtained through surveys including the Marine Recreational Information Program (MRIP), Large Pelagics Survey (LPS), Southeast Headboat Survey (HBS), and the Texas Headboat Survey. Please note that all 2015 data from these surveys is considered preliminary. Descriptions of these surveys, the geographic areas they include, and their limitations are discussed in the 2006 Consolidated HMS FMP (NMFS 2006a) and HMS SAFE Reports.

As noted in the dusky shark stock assessment reports, estimating total catches of prohibited sharks, including dusky sharks, is difficult and highly uncertain. There are issues with species misidentification and reporting in many of the available fishery-dependent data sources (e.g., observer, logbooks, MRIP, LPS, etc.). There is high interannual variability in reported catches, and low confidence in their accuracy, and it is unknown whether the reported values could over- or under-estimate true catch. Due to these problems in accurately estimating catch, the 2010/2011 SEDAR 21 benchmark assessment and 2016 stock assessment update for dusky sharks use a catch-free model to estimate stock status. Therefore, caution must be used when attempting to use or interpret the reported catch observations described in this section, and elsewhere in this document.

Bycatch estimates for dusky sharks in various fisheries, including non-HMS fisheries, are also provided in the 2011 National Bycatch Report (http://www.nmfs.noaa.gov/sfa/fisheries_eco/bycatch/nationalreport.html). However, due to the high uncertainty associated with the expanded total bycatch estimates, and the inherent species misidentification problems in the source data used in that report, the values for dusky sharks are not considered valid for stock assessment or management purposes. Data from the National Bycatch Report were not used in any of the dusky shark stock assessments for many of the same reasons other unreliable catch estimates were not used, as described above.

Shark Recreational Fishery

Recreational landings of sharks are an important component of HMS fisheries. Recreational shark fishing with rod and reel is a popular sport and, depending upon the species, sharks can be caught virtually anywhere in salt water. Recreational shark fisheries often occur in nearshore waters accessible to private vessels and charter/headboats; however, shore-based and offshore fishing also occur. Since 2003, the recreational fishery has been limited to rod and reel and handline gear only. Similar state regulations along the Atlantic seaboard are being implemented through an ASMFC interstate FMP (ASMFC 2008). Unlike billfish or bluefin tuna, recreational shark landings are not required to be reported to NMFS unless an angler is required to participate in the LPS or MRIP. However, as of 2013 for vessel owners in Maryland, and 2014 for vessel owners in North Carolina, shark landings must be reported on catch cards at state-operated landings stations. Recreational landings of individual shark species can be found in Table 3.13, Table 3.14, Table 3.15, Table 3.16, Table 3.17, Table 3.18.

The data shown in these tables are a combination of three data sources: MRIP, TX PWD, and Southeast Headboat Survey. MRIP data are extrapolated to estimate recreational catch in the entire fishery. Additional data on recreational shark landings can be found in Section 4.4.2 of the 2015 SAFE Report (NMFS 2015c). Please note that 2015 data are considered preliminary at this time.

Table 3.13 Estimated Recreational Harvest of Large Coastal Sharks in the Atlantic Region, in Number of Fish per Species (2008-2015). Sources: TX PWD, SE Headboat Survey, MRIP.

Species	2008	2009	2010	2011	2012	2013	2014	2015
Basking[2]	0	0	0	0	0	0	0	0
Bignose[1]	0	0	0	0	0	0	0	0
Bigeye sand tiger[2]	0	0	0	0	0	0	0	0
Blacktip	5,317	1,902	1,656	754	1,164	962	1,729	1,658
Bull	247	2	1	698	68	77	3	2
Caribbean reef[1]	0	0	0	0	0	0	0	0
Dusky[1]	1,501	506	4	23	15	16	2	0
Galapagos[1]	0	0	0	0	0	0	0	0
Hammerhead, great	3	5	0	0	37	0	0	1
Hammerhead, scalloped	1	569	13	179	4	248	900	0
Hammerhead, smooth	0	0	0	0	0	352	0	0
Hammerhead, unclassified	0	0	0	0	0	0	0	0
Lemon	1	291	0	14	0	0	0	144
Night[1]	0	0	0	0	0	0	0	0
Nurse	331	156	209	301	706	13	418	330
Sandbar[3]	4,210	6,461	2,193	1,125	857	399	1,873	240
Sand tiger[2]	1	0	0	0	0	0	0	0
Silky[3]	0	208	13	0	232	0	176	39
Spinner	0	179	693	679	1,145	390	847	81
Tiger	4	4	2	1	2	8	324	46
Whale[2]	0	0	0	0	0	0	0	0
White[2]	0	0	0	0	0	0	0	0
Requiem shark, unclassified	11,541	8,794	2,966	4,949	6,069	97	4,513	3,957
Total	23,157	19,077	7,750	8,723	10,299	2,562	10,785	6,498

[1]Prohibited in the recreational fishery as of July 1, 1999. [2]Prohibited as of April 1997. [3]Prohibited as of July 2008.

Table 3.14 Estimated Recreational Harvest of Large Coastal Sharks in the Gulf of Mexico Region, in Number of Fish per Species (2008-2015). Source: TX PWD, MRIP, Southeast Headboat Survey.

Species	2008	2009	2010	2011	2012	2013	2014	2015
Basking[2]	0	0	0	0	0	0	0	0
Bignose[1]	0	0	0	0	0	0	0	0
Bigeye sand tiger[2]	0	0	0	0	0	0	0	0
Blacktip	9,283	12,600	23,781	16,083	22,530	105,315	10,336	7,294
Bull	964	6,957	260	581	2,415	2,786	3,497	402
Caribbean reef[1]	0	1	0	0	0	0	0	0
Dusky[1]	58	40	87	125	42	20	598	1
Galapagos[1]	0	0	0	0	0	0	0	0
Hammerhead, great	10	123	3	126	5	7	2	0
Hammerhead, scalloped	118	105	140	22	24	517	14	5
Hammerhead, smooth	0	0	0	0	0	0	0	0
Hammerhead, unclassified	0	0	0	0	0	0	0	0
Lemon	1,065	3	781	1,274	0	0	0	0
Night[1]	0	22	0	0	0	55	0	0
Nurse	14	729	25	1,098	2	2	0	1
Sandbar[3]	211	701	883	200	46	1,404	62	4
Sand tiger[2]	0	0	0	0	0	0	0	0
Silky[3]	390	0	64	74	0	615	0	337
Spinner	3,111	2,461	6,040	1,694	4,975	6,022	568	636
Tiger	1	0	366	52	0	3	4	2
Whale[2]	0	0	0	0	0	0	0	0
White[2]	0	0	0	0	0	0	0	0
Requiem shark, unclassified	2,937	24,972	68,134	38,876	16,454	17,606	2,440	3,407
Total	18,162	48,714	100,564	60,205	46,493	134,352	17,521	12,089

[1]Prohibited in the recreational fishery as of July 1, 1999. [2]Prohibited as of April 1997. [3]Prohibited as of July 2008.

Table 3.15 Estimated Recreational Harvest of Pelagic Sharks in the Atlantic and Gulf of Mexico, in Number of Fish per Species (2008-2015). Source: TX PWD, Southeast Headboat Survey, MRIP.

Species	2008	2009	2010	2011	2012	2013	2014	2015
Bigeye thresher*	0	0	0	0	0	0	0	0
Bigeye sixgill*	0	0	0	0	0	0	0	0
Blue Shark	87	0	1,512	0	0	4,165	3,449	9,397
Mako, longfin*	0	0	0	0	0	0	0	0
Mako, shortfin	1,087	5,058	3,297	301	1,314	6,855	16,532	12,546
Mako, unclassified	0	213	161	396	14	12	5	0
Lamnidae (mackerel sharks)	0	1	345	3,090	5,706	24	19,898	237
Oceanic whitetip	0	0	0	0	0	0	0	131
Porbeagle	0	0	0	19	0	0	0	0
Sevengill*	0	0	0	0	0	0	0	0
Sixgill*	0	0	0	0	0	0	0	4
Thresher	798	3,422	214	0	0	0	3,165	11,607
Pelagic shark, unclassified	0	0	0	0	0	0	0	0
Total	1,972	8,694	5,529	3,806	7,034	11,056	43,049	33,922

*Prohibited in the recreational fishery as of July 1, 1999.

Table 3.16 Estimated Recreational Harvest of Small Coastal Sharks in the Atlantic Region, in Number of Fish per Species (2008-2015). Sources: TX PWD, Southeast Headboat Survey, MRIP.

Species	2008	2009	2010	2011	2012	2013	2014	2015
Atlantic angel*	0	0	0	0		0	0	0
Blacknose	2	947	0	573	0	70	4,146	1,158
Bonnethead	12,225	8,009	10,073	8,598	9,798	14,375	28,533	2,806
Finetooth	1,347	0	239	0	0	0	2,896	274
Atlantic sharpnose	33,489	33,568	41,217	28,252	23,207	44,832	56,052	27,806
Caribbean sharpnose*	0	0	0	0	0	0	0	0
Smalltail*	0	0	0	0	0	0	0	0
Total	47,063	42,524	51,529	37,423	33,005	59,277	91,627	32,044

*Prohibited in the recreational fishery as of July 1, 1999.

Table 3.17 Estimated Recreational Harvest of Small Coastal Sharks in the Gulf of Mexico Region, in Number of Fish per Species (2008-2015). Sources: TX PWD, Southeast Headboat Survey, MRIP.

Species	2008	2009	2010	2011	2012	2013	2014	2015
Atlantic angel*	0	0	0	0	0	0	0	0
Blacknose	2,468	5,276	1,463	1,533	2,638	232	4,380	740
Bonnethead	8,939	14,189	6,084	51,714	6,764	7,757	19,072	6,779
Finetooth	665	395	380	47	248	239	80	97
Atlantic sharpnose	38,927	31,237	29,494	19,072	40,302	45,616	25,409	28,171
Caribbean sharpnose*	0	0	0	0	0	0	0	0
Smalltail*	0	0	0	0	0	0	0	0
Total	50,999	51,097	37,421	72,366	49,952	53,844	48,941	35,787

*Prohibited in the recreational fishery as of July 1, 1999.

Table 3.18 Estimated Recreational Harvest of Smoothhound Sharks in the Gulf of Mexico and Atlantic Regions, in Number of Fish (2008-2015).

Region	2008	2009	2010	2011	2012	2013	2014	2015
Atlantic	47,113	18,099	19,659	21,040	31,666	17,309	49,834	43,428
Gulf of Mexico	0	0	190	0	1,258	214	7	3
Total	47,113	18,099	19,849	21,040	32,924	17,523	49,841	43,431

3.4.2.3 Bycatch Issues and Data Associated with the Fishery

Bycatch in the recreational rod and reel fishery is difficult to quantify because many fishermen simply value the experience of fishing and may not be targeting a particular species. The 1999 Billfish Amendment established a catch-and-release fishery management program for the recreational Atlantic billfish fishery. As a result of this program, all Atlantic billfish that are released alive, regardless of size, are not considered bycatch. The recreational white shark fishery is by regulation a catch-and-release fishery only, and white sharks are not considered bycatch.

Bycatch can result in death or injury to discarded fish; therefore, bycatch mortality is incorporated into fish stock assessments, and into the evaluation of management measures. Rod and reel discard estimates from Virginia to Maine from the months of June through October could be monitored through the expansion of survey data derived from the LPS (dockside and telephone surveys), or could be assessed through other monitoring programs (such as logbooks, etc.). However, the actual numbers of sharks discarded for many species are so low that presenting the data by area could be misleading, particularly if the estimates are expanded for unreported effort in the future. The number of kept and released sharks reported or observed through the LPS dockside intercepts for 2005 – 2015 is presented in Table 3.19and Table 3.20. LPS data represent all sharks observed or reported and are not extrapolated to present estimates covering the entire fishery. Therefore, the LPS data in the below tables differs from the estimates provided by MRIP data in the above tables.

An outreach program to help address bycatch and to educate anglers on the benefits of circle hooks, and encourage their voluntary use, has been implemented by NMFS. In January 2011, NMFS developed and released a brochure that provides guidelines on how to increase the survival of hook-and-line caught large pelagic species. This brochure is available at: http://www.nmfs.noaa.gov/sfa/hms/compliance/guides/careful_release_brochure.pdf.

Table 3.19 Observed or Reported number of Sharks Kept in the Rod and Reel Fishery, Maine through Virginia (2005-2015). Source: Large Pelagics Survey.

Species	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Thresher shark	45	34	62	59	66	44	41	39	31	55	68
Mako shark	99	111	143	169	159	159	172	151	179	180	152
Sandbar shark	1	1	9	1	1	0	1	0	0	0	1
Dusky shark	0	3	6	1	0	1	0	0	0	0	0
Tiger shark	1	0	1	1	3	1	0	2	0	2	3
Porbeagle	1	1	0	0	0	2	2	2	6	3	3
Blacktip shark	1	1	0	-	-	0	0	0	0	0	0
Atlantic sharpnose shark	0	0	0	-	-	10	5	3	22	6	-
Blue shark	67	61	109	43	54	26	30	28	12	10	25
Hammerhead shark	0	0	0	1	0	0	0	0	0	0	0
Smooth hammerhead	0	0	0	1	0	0	0	0	0	0	0
Scalloped hammerhead	0	1	0	0	0	0	0	0	0	0	0
Unidentified hammerhead	0	0	0	0	0	0	0	0	0	0	0
Spinner	0	0	0	0	0	0	0	0	0	0	1

Table 3.20 Observed or Reported Number of Sharks Released in the Rod and Reel Fishery, Maine through Virginia (2005-2015). Source: Large Pelagics Survey.

Species	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Thresher shark[1]	9	15	24	35	23	21	9	16	10	23	42
Mako shark	142	177	190	242	250	276	224	238	206	237	385
Sandbar shark	37	158	168	222	219	37	45	14	44	62	50
Dusky shark	49	73	87	128	152	116	84	76	90	57	102
Tiger shark	6	7	11	20	11	13	25	26	19	32	18
Porbeagle	6	8	2	2	6	11	31	18	22	21	42
Blacktip shark	19	9	31	-	-	34	10	346	89	33	13
Atlantic sharpnose shark	11	0	0	-	-	5	3	4	22	3	-
Blue shark[1, 2, 3]	920	884	1,978	2,735	4,185	3,333	3,752	2,705	2,240	1,894	2167
Hammerhead shark	5	0	0	0	0	0	1	2	0	1	0
Great hammerhead shark	0	0	0	0	0	0	0	0	0	0	7
Smooth hammerhead shark	0	1	2	0	1	1	3	3	0	6	2
Scalloped hammerhead shark	0	0	0	4	2	0	0	4	0	2	2
Unidentified hammerhead shark	0	11	14	27	31	32	10	30	20	23	28
Unidentified shark	0	0	0	0	0	0	0	0	0	0	10
Sand Tiger	0	0	0	0	0	0	0	0	0	0	18
Spinner	0	0	0	0	0	0	0	0	0	0	73
White	0	0	0	0	0	0	0	0	0	0	3

[1]Includes dead releases in 2011. [2]Includes dead releases in 2010. [3]Includes dead releases in 2015.

3.4.3 Bottom Longline

Bottom longline (BLL) gear is the primary commercial gear employed for targeting large coastal sharks (LCS) in all regions. Small coastal sharks (SCS) are also caught on BLL. Gear characteristics vary by region and target species. In 2015, hauls targeting LCS used BLL consisting of a longline between 0.9 to 14.0 km (0.6 – 8.7 miles) long with 45-500 hooks attached and the average soak duration was 7.5 hours. Depending on the species being targeted, both circle and J hooks are used. Fishermen targeting LCS with BLL gear most commonly used 16.0 circle hooks (75.0 percent of the time). Hauls targeting sandbar sharks used BLL consisting of longline average of 8.3 km (5.2 miles) long with 99-300 hooks attached and the average soak duration was 5.6 hours. The most commonly used hook was the 18.0 circle hook used on 42.4 percent of the hauls (Enzenauer et al., 2016).

The overall BLL effort targeting sharks by region is available from 2008 through 2015 (Table 3.21). The Atlantic region has more vessels and trips targeting sharks, but the number of trips targeting sharks in the Gulf of Mexico region has surpassed the Atlantic region in 2012-2014. The number of trips is defined as targeting sharks if 75 percent of the landings, by weight, were sharks.

Table 3.21 Bottom Longline Effort Targeting Sharks (2008-2014).

Specifications	Region	2008	2009	2010	2011	2012	2013	2014
Number of Vessels	Gulf of Mexico	16	11	7	11	20	16	20
	Atlantic	17	26	32	26	21	24	19
Number of Trips	Gulf of Mexico	136	80	54	194	379	457	604
	Atlantic	289	498	486	434	281	329	369
Average Sets per Trip	Gulf of Mexico	1.8	2.5	1.2	1.4	1.2	1.1	1.1
	Atlantic	1.2	1.3	1.4	1.3	1.5	1.5	1.7
Total Number of Set Hooks	Gulf of Mexico	160,520	65,225	15,380	48,112	99,675	105,559	139,709
	Atlantic	121,353	260,883	239,952	183,465	98,094	136,475	193,561
Average Number of Hooks per Set	Gulf of Mexico	454.5	451.6	215.6	213.8	229.0	212.1	206.1
	Atlantic	389.2	414.1	327.3	330.3	237.1	253.5	276.7
Total Soak Time (Hours)	Gulf of Mexico	1,745.0	918.0	396.0	1,361.0	2,912.0	2,589.5	3,011.0
	Atlantic	2,150.0	3,275.5	3,490.5	3,331.0	2,289.5	2,438.0	2,649.5
Average Mainline Length (Miles)	Gulf of Mexico	7.6	5.6	2.6	3.0	2.8	2.1	1.9
	Atlantic	6.0	6.2	4.7	5.1	3.9	3.4	3.4

Source: Fisheries Logbook System.

3.4.3.1 Current Management

For a description of the history of bottom longline fishery management, please refer to Chapter 1.0 of this document and the Amendment 6 to the 2006 Consolidated HMS FMP. As discussed in Chapter 1.0, Amendment 2, which included a rebuilding plan for dusky sharks, included measures that significantly reduced effort in the bottom longline fishery, including elimination of the sandbar shark fishery quota except for a small research quota with 100 percent observer coverage, reduced retention limits and quotas for other coastal sharks, and improved reporting requirements. Current commercial regulations also include limited access vessel permits requirements, commercial quotas, vessel retention limits, a prohibition on landing 20 species of sharks (one of these species can be landed in the shark research fishery), numerous closed areas, gear restrictions, landing restrictions (including requiring all sharks be landed with fins naturally attached), fishing regions, vessel monitoring system requirements, dealer permits, and vessel and dealer reporting requirements.

3.4.3.2 Recent Catch, Landings, and Discards

This section provides information on shark landings, species composition, bycatch, and discards as reported in the shark BLL observer program. Since 2002, shark BLL vessels have been required to take an observer if selected. Participants in the shark research fishery are required to take an observer when targeting sandbar sharks. Outside the research fishery and depending on the time of year and fishing season, vessels that target sharks, possessed current valid directed shark permit, and reported fishing with longline gear in the previous year were randomly selected for coverage with a target coverage level of 5-10 percent for shark directed (Enzenauer et al., 2016).

In 2015, the BLL observer program selected 9 vessels for the entire fishing season. These vessels were observed for a total of 83 BLL hauls (defined as setting gear, soaking gear for some duration of time, and retrieving gear) and a total of 116 trips (defined as from the time a vessel leaves the port until the vessel returns to port and lands catch, including multiple hauls therein). Gear characteristics of trips varied by area (Gulf of Mexico or the U.S. Atlantic Ocean) and target species (non-sandbar LCS or sandbar shark) (Enzenauer et al., 2016). In the non-research shark fishery, the BLL observer program observed trips from the southern U.S. Atlantic (the coastline from North Carolina to Florida) region. The observed non-research shark fishery hauls targeted coastal shark species in the southern U.S. Atlantic. Approximately 73 trips with 99 hauls were observed. These trips caught mostly blacktip sharks with Atlantic sharpnose, blacknose, and bull sharks being the next most caught species (Table 3.22).

Table 3.22 Shark Species Caught on Observed Bottom Longline Targeting Coastal Shark Species in the Southern U.S. Atlantic (2015).

Species	Total Caught (#)	Kept (%)	Discarded Dead (%)	Discarded Alive (%)	Disposition Unknown (%)
Blacktip shark	280	91.8	6.8	1.1	0.4
Atlantic sharpnose shark	142	7.0	83.1	9.9	0.0
Blacknose shark	53	0.0	88.7	11.3	0.0
Bull shark	37	86.5	0.0	10.8	2.7
Scalloped hammerhead shark	34	61.8	38.2	0.0	0.0
Spinner Shark	16	62.5	31.3	6.3	0.0
Sandbar Shark	15	0.0	6.7	93.3	0.0
Sand tiger shark	14	0.0	0.0	100.0	0.0
Lemon shark	7	100.0	0.0	0.0	0.0
Tiger shark	4	75.0	0.0	25.0	0.0
Great hammerhead shark	4	100.0	0.0	0.0	0.0
Bonnethead shark	1	0.0	100.0	0.0	0.0
Total	607				

Source: Enzenauer et al., 2016.

In 2015, the Shark Research Fishery commenced with 7 participants. Due to the number of observed vessels, the observed data were combined for the Gulf of Mexico and southern Atlantic to protect confidentiality of vessels consistent with the requirements of the MSA. NMFS changed the regulations for vessels participating in the shark research fishery in 2015 by modified the regional dusky bycatch caps and observers must be allowed to retain and land up to three whole sharks per trip (Table 3.23).

Table 3.23 Summary of Shark Research Fishery Management Measures (2012-2015).

Management Measure	2012	2013	2014	2015
Number of Vessels	5	6	5	7
Number of Trips per Month	1	1	1	1
Captain's Meeting Held	Yes	Yes	Yes	Yes
Retention Limits	None. All sharks, except for prohibited species, brought to vessel dead must be landed.	None. All sharks, except for prohibited species, brought to vessel dead must be landed.	None. All sharks, except for prohibited species, brought to vessel dead must be landed.	None. All sharks, except for prohibited species, brought to vessel dead must be landed.
Gear Restrictions	Set limit: one longline set per trip Hook restriction: ≤ 150 or fewer hooks on board *Amendment 1* Set limit: two non-concurrent longline sets per trip: 1st set ≤ 75 hooks; soak time no more than 2 hours; 2nd set ≤ 150 hooks; no soak time limit Hook restriction: ≤ 250 hooks on board *Amendment 2* Set limit: two non-concurrent longline sets per trip: 1st set ≤ 150 hooks; soak time no more than 2 hours; 2nd set ≤ 300 hooks; no soak time limit Hook restriction: ≤ 500 hooks on board	Set limit: two non-concurrent longline sets per trip: 1st set ≤ 150 hooks; soak time no more than 2 hours; 2nd set ≤ 300 hooks; no soak time limit Hook restriction: ≤ 500 hooks on board	Set limit: two non-concurrent longline sets per trip: 1st set ≤ 150 hooks; soak time no more than 2 hours; 2nd set ≤ 300 hooks; no soak time limit Hook restriction: ≤ 500 hooks on board	Set limit: two non-concurrent longline sets per trip: 1st set ≤ 150 hooks; soak time no more than 2 hours; 2nd set ≤ 300 hooks; no soak time limit Hook restriction: ≤ 500 hooks on board
Individual Vessel Quota	Sandbar quota and LCS research quota split equally among selected vessels Sandbar: 14.06 mt dw Non-sandbar LCS: 6.0 mt dw	Sandbar quota and LCS research quota split equally among selected vessels Sandbar: 15.5 mt dw Non-sandbar LCS: 6.7 mt dw	Sandbar quota and LCS research quota split equally among selected vessels Sandbar: 18.6 mt dw Non-sandbar LCS: 8.0 mt dw	Sandbar quota and LCS research quota split equally among selected vessels Sandbar: 13.3 mt dw Non-sandbar LCS: 5.7 mt dw

Management Measure	2012	2013	2014	2015
Mid-Atlantic Closed Area	Vessels could fish in the closed area	Vessels could not fish in the closed area	Vessels could fish in the closed area only when the observer program intends to place a satellite archival tag(s) on a dusky shark(s)	Vessels could fish in the closed area only when the observer program intends to place a satellite archival tag(s) on a dusky shark(s)
Dusky Bycatch Cap	None	No more than five dusky shark interactions were allowed in any of the designated regions (North Carolina, Georgia/ South Carolina, east coast of Florida, the Florida Keys, west coast of Florida, and rest of the Gulf of Mexico) through the entire year	Once three dead dusky shark are observed, a three hour soak time restriction is implemented and no more than three dusky shark interactions were allowed in any of the designated regions (North Atlantic, North Carolina, South Atlantic, the Florida Keys, west coast of Florida, and the west coast of Florida) through the entire year	Once three dead dusky sharks are observed, a three hour soak time restriction is implemented and no more than three dusky shark interactions were allowed in any of the designated regions (North Carolina, the Florida Keys, and the Gulf of Mexico) through the entire year. Once six dead dusky sharks are observed, a three hour soak time restriction is implemented and no more than six dusky shark interactions were allowed in South Atlantic region through the entire year (Figure 3.8).

Figure 3.8 Regional Dusky Bycatch Cap Regions for the Shark Research Fishery.

The Shark Research Fishery targeted sandbar sharks in the Gulf of Mexico and southern Atlantic. In 2015, a total of 73 trips with 99 hauls were observed. These trips caught mostly sandbar sharks with tiger, Atlantic sharpnose, and dusky sharks being the next most caught species (Table 3.24). All of the dusky sharks were observed on trips targeting sandbar sharks.

Table 3.24 Shark Species Caught on Observed Bottom Longline Trips in the Sandbar Shark Research Fishery in the Gulf of Mexico and Southern Atlantic (2015).

Species	Total Caught (#)	Kept (%)	Discarded Dead (%)	Discarded Alive (%)	Disposition Unknown (%)
Sandbar shark	3,771	98.4	0.1	0.2	1.3
Tiger shark	325	52.0	0.9	45.8	1.2
Atlantic sharpnose shark	268	17.5	71.6	10.8	0.0
Dusky shark	248	0.0	8.9	91.1	0.0
Blacktip shark	243	96.3	2.9	0.0	0.8
Scalloped hammerhead shark	138	89.1	2.9	7.2	0.7
Great hammerhead shark	117	88.0	0.9	8.5	2.6
Nurse shark	86	0.0	0.0	100.0	0.0
Bull shark	84	94.0	0.0	0.0	6.0
Spinner shark	74	98.6	1.4	0.0	0.0
Blacknose shark	69	33.3	49.3	417.4	0.0
Lemon shark	65	95.4	0.0	1.5	3.1
Sand tiger shark	30	0.0	0.0	93.3	6.7
Silky shark	19	78.9	10.5	10.5	0.0
Hammerhead sharks	5	0.0	20.0	40.0	40.0
Requiem shark family	4	0.0	0.0	75.0	25.0
Finetooth shark	2	100.0	0.0	0.0	0.0
Great white shark	1	0.0	100.0	0.0	0.0
Total	5,549				

Source: Enzenauer et al., 2016.

3.4.3.3 Bottom Longline Interactions with Protected Resources

For more detailed information on the fishery classification and requirements under the Marine Mammal Protection Act (MMPA; 16 U.S.C. 1361 et seq.) and the Endangered Species Act (ESA), please see the Final Environmental Assessment prepared for Amendment 6 to the 2006 Consolidated HMS FMP. On July 3, 2014, NMFS issued the final determination to list the Central and Southwest Atlantic Distinct Population Segment (DPS) of scalloped hammerhead shark as a threatened species pursuant to the Endangered Species Act (ESA) (79 FR 38214). The Central and Southwest Atlantic DPS of scalloped hammerhead sharks occur within the management area of Atlantic HMS commercial and recreational fisheries which are managed by NMFS's Office of Sustainable Fisheries, HMS Management Division. On August 27, 2014, NMFS published a final rule to list 7 coral species as threatened: five in the Caribbean including Florida and the Gulf of Mexico (*Dendrogyra cylindrus*, *Orbicella annularis*, *O. faveolata*, *O. franksi*, and *Mycetophyllia ferox*). Two Caribbean species currently listed as threatened (*Acropora cervicornis* and *A. palmata*) still warranted listing as threatened.

Table 3.25 provides information on observed interactions with protected resources for BLL vessels targeting sharks in the Gulf of Mexico and Atlantic regions. In 2015, two smalltooth sawfish and four loggerhead sea turtles were observed on sets targeting sandbar sharks. All were released alive. No sea bird or marine mammal interactions were observed. No interactions with protected resources (sea bird, sea turtle, sawfish, or marine mammal) were observed for non-research BLL vessels fishing in the Gulf of Mexico and South Atlantic regions targeting LCS (Enzenauer et al., 2016). Per the ITS in the 2012 biological opinion, the incidental take of listed sea turtles, smalltooth sawfish, or Atlantic sturgeon has not been exceeded over any 3-yr period.

Table 3.25 Protected Species Interactions Observed Bottom Longline Trips Targeting Sharks in the Gulf of Mexico and Atlantic Ocean (2007-2015).

Year	Sea Turtles	Sea Birds	Marine Mammals	Smalltooth Sawfish	Total
2007	4 (2A, 2D)	-	-	3 (2A, 1D)	7
2008	1 (A)	-	-	2 (A)	3
2009	2 (D)	-	-	5 (A)	7
2010	4 (2A, 2D)	-	-	10 (A)	14
2011	4 (1A, 3D)	-	-	2 (A)	6
2012	2 (A)	-	-	1 (D)	3
2013	-	-	-	2 (A)	2
2014	7 (5A, 2D)	-	-	5 (A)	12
2015	4 (4A, 0D)	-	-	2 (A)	6
Total	28	0	0	32	60

Letters in parentheses indicate whether the animal was released alive (A), dead (D), or unknown (U).

3.5 HMS Permits and Tournaments

This section provides updates for the number of permits that were issued in conjunction with HMS fishing and dealer activities. The number of permits for Atlantic HMS fisheries permit and the number of dealer permits for shark, swordfish, and tunas are updated through October 2015.

3.5.1 HMS Limited Access Permits

The limited access permit program was implemented in the 1999 FMP and became effective on July, 1 1999 (64 FR 29090, May 28, 1999) (NMFS 1999). The limited access permit program includes six different permit types: Swordfish Directed, Swordfish Incidental, Swordfish Handgear, Shark Directed, Shark Incidental, and Atlantic Tuna Longline. The Swordfish Directed and Incidental permits are valid only if the permit holder also holds both an Atlantic Tuna Longline and a shark limited access permit. Similarly, the Atlantic Tuna Longline permit is valid only if the permit holder also holds both a swordfish (Directed or Incidental, not Handgear) and a shark limited access permit. No additional limited access permits are required to make a Swordfish Handgear or any of the shark permits valid. The shark limited access permits allow fishermen to land any shark, except, as of March 15, 2016, any smoothhound sharks. If a fisherman wishes to land a smoothhound shark commercially, that fisherman needs an open access smoothhound shark permit. There have been between 536 and 636 limited access permit holders annually from 2008 through 2015 (Table 3.26). Please see Chapter 3 of Amendment 6 to the 2006 Consolidated HMS FMP (NMFS 2006a) and HMS SAFE Reports for additional information.

Table 3.26 Number of Shark, Swordfish, and Atlantic Tunas Longline Limited Access Permits and Permit Holders by State (2008-2015).

State	Directed Swordfish	Incidental Swordfish	Swordfish Handgear	Directed Shark	Incidental Shark	Tuna Longline	Permit Holders/ Permits
ME	4	1	1	2	6	5	9 / 19
MA	5	1	9	2	10	8	22 / 35
RI	1	-	11	1	3	2	13 / 18
CT	1	-	1	-	1	1	2 / 4
NY	16	3	4	10	12	20	27 / 65
PA	2	-	-	1	2	2	3 / 7
NJ	27	11	2	22	27	41	53 / 130
DE	2	-	1	2	2	2	5 / 9
MD	3	-	-	1	3	3	4 / 10
VA	1	1	-	-	2	4	4 / 8
NC	10	6	-	18	10	16	28 / 60
SC	3	2	-	7	9	5	16 / 26
GA	-	-	-	2	2	-	4 / 4
FL	83	35	53	124	135	122	315 / 552
AL	-	-	-	4	2	-	6 / 6
MS	-	-	-	-	1	-	1 / 1
LA	28	5	-	24	33	37	63 / 127
TX	1	7	1	3	13	10	20 / 35
OR					1		1/1
Canada	-					1	1/1
Trinidad/ Tobago	1	-	-	1		1	1/3
Annual Totals							
2015*	188	72	83	224	275	280	599 / 1,122
2014	183	66	77	206	258	246	536 / 1,036
2013	185	71	81	220	265	252	556 / 1,074
2012	184	73	77	215	271	253	555 / 1,073
2011	178	67	78	217	262	242	555 / 1,044
2010	177	72	75	215	265	248	566 / 1,052
2009	187	72	81	223	285	259	636 / 1,107
2008	181	76	81	214	285	241	628 / 1,079

*As of October 2015. Number of permit holders in each category and state is subject to change as permits are renewed or expire.

3.5.2 HMS Charter/Headboat Permits

In 2002, NMFS published a final rule (67 FR 77434, Dec. 18, 2002) expanding the HMS recreational permit from tuna only to include all HMS and defining HMS charter/headboat operations. This permit was effective March 2003 and established a requirement that owners of charter boats or headboats that are used to fish for, take, retain, or possess Atlantic tunas, sharks, swordfish, or billfish must obtain an Atlantic HMS Charter/Headboat permit. This permit replaced the Atlantic Tunas Charter/Headboat permit. A vessel issued an Atlantic HMS Charter/Headboat permit for a fishing year will not be issued an HMS Angling permit or any Atlantic Tunas permit in any category for that same fishing year, even if there is a change in the vessel's ownership. There were 3,596 HMS Charter/Headboat permits as of October 2015. Please see Section 8.1 of the 2015 SAFE Report for additional information (NMFS 2015c).

3.5.3 HMS Angling Permits

Since March 2003 (67 FR 77434, Dec. 18, 2002), the HMS Angling Permit has been required to fish for, retain, or possess, including catch and release fishing, any federally regulated HMS. Species authorized for harvest with an HMS Angling permit include: sharks, swordfish, white and blue marlin, sailfish, roundscale spearfish, and federally regulated Atlantic tunas (bluefin tuna, yellowfin, bigeye, skipjack, and albacore). Atlantic HMS caught, retained, possessed, or landed by persons on board vessels with an HMS Angling category permit may not be sold or transferred to any person for a commercial purpose. By definition, recreational landings of Atlantic HMS are those that cannot be marketed through commercial channels, therefore it is not possible to monitor anglers' catches through ex-vessel transactions as in the commercial fishery. Instead, NMFS conducts statistical sampling surveys of the recreational fisheries. There were 20,193 HMS Angling permits issued as of October 2015. For more information, please see Section 8.1 of the 2015 SAFE Report (NMFS 2015c).

3.5.4 HMS Atlantic Tunas General and Swordfish General Permits

Atlantic Tunas General category and Swordfish General Commercial permit holders fishing recreationally for sharks in HMS tournaments may be affected by the preferred alternatives described in Chapter 2.0. As of October 2015, there are 3,129 Atlantic Tunas General category permit holders and 651 Swordfish General Commercial permit holders. For more information, please see Section 8.1 of the 2015 SAFE Report (NMFS 2015c).

3.5.5 HMS Dealer Permits

HMS dealer permits are required for commercial receipt of Atlantic tuna, swordfish, and sharks, and are described in further detail in the 2006 Consolidated HMS FMP (NMFS 2006a). Dealer permits are open access. An Atlantic shark dealer permit is required for any entity, person, or company that is the "first receiver" of any Atlantic shark or part of an Atlantic shark. A first receiver is any entity, person, or company that takes, for commercial purposes (other than solely for transport), immediate possession of the fish, or any part of the fish, as the fish are offloaded from a fishing vessel of the United States. Shark dealers, or a proxy for each location that first receives sharks, must attend and successfully complete an Atlantic Shark Identification

Workshop, and be issued a certificate in order to obtain or renew their shark dealer permit. Also, trucks or other conveyances which are extensions of a shark dealer's place of business must possess a copy of a valid Atlantic Shark Identification Workshop Certificate. All permitted dealers are required to submit reports detailing the nature of their business. Swordfish and shark dealer permit holders must submit bi-weekly dealer reports on all HMS they purchase. NMFS continues to automate and improve its permitting and dealer reporting systems and plans to make additional permit applications and renewals available online in the near future.

On August 8, 2012, NMFS published a final rule requiring electronic reporting for Atlantic sharks, swordfish, and BAYS tunas dealers (77 FR 47303) through one centralized electronic reporting system (eDealer). The eDealer system became effective on January 1, 2013. Electronic reporting ensures more timely and accurate reporting, which is critical for quota monitoring and management of these species. There were 687 Atlantic HMS dealer permits distributed, as of October 2015; 289 of those permits were for bluefin and BAYS tunas, 184 were for swordfish and 102 were for sharks. Please see Section 8.1 of the 2015 SAFE Report for additional information (NMFS 2015c).

3.5.6 Exempted Fishing Permits (EFPs), Display Permits, and Scientific Research Permits (SRPs)

EFPs, display permits, letters of acknowledgement (LOAs), and SRPs are issued under the authority of the Magnuson-Stevens Act (16 U.S.C. 1801 et seq.) and/or ATCA (16 U.S.C. 971 et seq.). EFPs are issued to individuals for the purpose of conducting research or other fishing activities using private (non-NOAA) vessels, whereas an SRP would be issued to agency scientists who are using NOAA vessels as their research platform. Similar to SRPs, LOAs are issued to individuals conducting research from "bona fide" research vessels on species that are only regulated by Magnuson-Stevens Act and not ATCA. NMFS does request research plans for these activities and indicates concurrence by issuing an LOA. Display permits are issued to individuals who are fishing for, catching, and then transporting HMS to certified aquariums for public display. Regulations at 50 CFR 600.745 and 50 CFR 635.32 govern scientific research activity, exempted fishing, and exempted educational activity with respect to Atlantic HMS. Amendment 1 to the 1999 FMP implemented and created a separate display permitting system, which operates apart from the exempted fishing activities that are focusing on scientific research (NMFS 2003). The application process for display permits is similar to that required for EFPs and SRPs. When NMFS implemented Amendment 2 to the 2006 Consolidated HMS FMP (73 FR 35788, June, 24 2008), the shark quota for EFPs, display permits, and SRPs remained the same (NMFS 2008a). However, the quota for sandbar shark was reduced to 1.4 mt authorized for display and 1.4 mt authorized for research under EFPs and SRPs.

In 2008, NMFS established a shark research fishery (NMFS 2008a). This research fishery is conducted under the auspices of the exempted fishing program. Research fishery permit holders assist NMFS in collecting valuable shark life history data and data for future shark stock assessments. Fishermen must fill out an application for a shark research permit under the exempted fishing program to participate in the shark research fishery. In 2014, NMFS received 9 applications for entrance into the 2015 shark research fishery. Based on the qualification criteria, 7 were chosen to participate. In 2015, NMFS received 13 applications for entrance into

the 2016 shark research fishery; 5 were chosen to participate. The research fishery is very closely monitored, and shark research fishery participants are subject to 100 percent observer coverage in addition to other terms and conditions of the research permit. Additionally, the research fishery is subject to regional bycatch caps of dusky sharks, where the fishery in each region may be closed if its dusky shark bycatch cap is reached. The terms and conditions of the permits, including specifications on how many sharks can be caught, have changed every year depending on the research objectives for that year. The data collected so far has been used in recent shark assessments, and was used in the 2016 dusky shark assessment.

EFPs, display permits, and SRPs may be issued where possession of certain species is otherwise prohibited. These EFPs, SRPs, and display permits may authorize collections of tunas, swordfish, billfishes, and sharks from Federal waters in the Atlantic Ocean and Gulf of Mexico for the purposes of scientific data collection and public display.

The number of EFPs, display permits, and SRPs issued from 2011-2015 by category and species are listed in Table 3.27.

Table 3.27 Number of Atlantic HMS Exempted Fishing Permits (EFPs), Display Permits, and Scientific Research Permits (SRPs) (2011-2015). Does not include vessels issued an EFP for the shark research fishery.

Permit type		2011	2012	2013	2014	2015*
Exempted Fishing Permit	Sharks for display	3	4	4	3	3
	HMS** for display	2	2	2	3	1
	Tunas for display	0	0	0	0	0
	Shark research on a non-scientific vessel	8	10	10	10	11
	Tuna research on a non-scientific vessel	5	5	4	2	2
	HMS** research on a non-scientific vessel	2	3	3	3	4
	Billfish research on a non-scientific vessel	2	1	1	0	0
	Shark Fishing	0	0	0	0	0
	HMS Chartering	0	0	0	0	0
	Tuna Fishing	0	0	0	1	1
	TOTAL	22	25	24	22	22
Scientific Research Permit	Shark research	3	4	3	2	4
	Tuna research	1	3	2	2	1
	Billfish research	0	0	0	0	0
	HMS** research	6	4	3	3	1
	TOTAL	10	11	8	7	6
Letters of Acknowledgement	Shark research	7	7	6	8	8
	TOTAL	7	7	6	8	8

*As of October 31, 2015. ** Multiple species.

3.5.7 Atlantic HMS Tournaments

An Atlantic HMS tournament is any fishing competition involving Atlantic HMS in which participants must register or otherwise enter or in which a prize or award is offered for catching or landing such fish. Atlantic HMS tournaments are conducted from ports along the U.S. Atlantic coast, Gulf of Mexico, and U.S. Caribbean. Some foreign tournaments (e.g., those held in the Bahamas, Bermuda, and the Turks and Caicos) may voluntarily register because their participants are mostly U.S. citizens. Since 1999, Federal regulations have required that tournaments register with NMFS at least four weeks prior to the commencement of tournament fishing activities. Tournament operators may be selected by NMFS for reporting, in which case a record of tournament catch and effort must be submitted to NMFS within seven days of the conclusion of the tournament.

Atlantic HMS tournaments vary in size. They may range from relatively small, "members-only" club events with as few as ten participating boats (40 – 60 anglers) to larger, statewide tournaments with 250 or more participating vessels (1,000 – 1,500 anglers). Larger tournaments often involve corporate sponsorship from tackle manufacturers, marinas, boat dealers, marine suppliers, beverage distributors, resorts, radio stations, publications, chambers of commerce, restaurants, and other local businesses.

The number of HMS tournaments that registered each year from 2005 to 2015 is reported in Figure 3.9. Since 2005, an average of 260 HMS tournaments have registered each year. The highest number of HMS tournament registrations occurred in 2007. The number of registered tournaments in 2014 is the highest since 2007, possibly due to increased outreach and compliance monitoring, and may also be influenced by an improving U.S. economy and lower fuel prices.

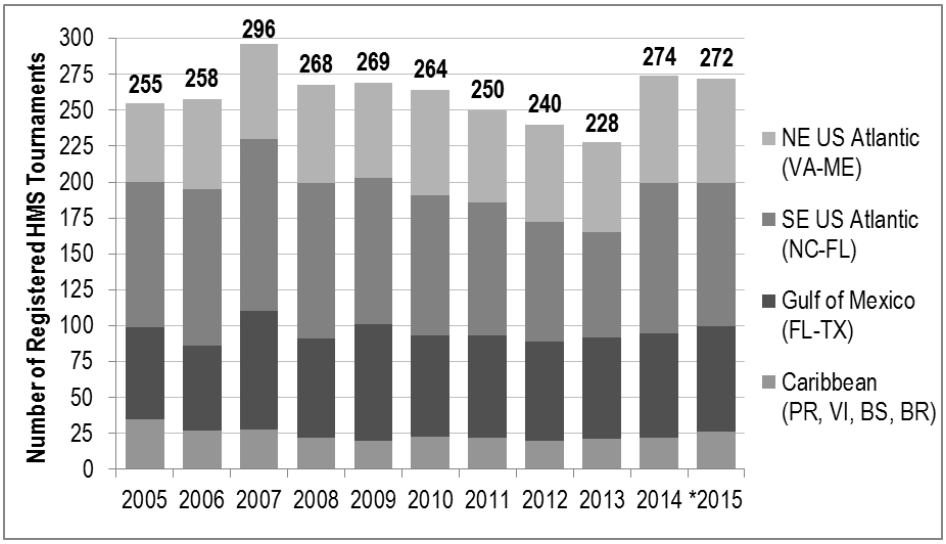

Figure 3.9 Number of registered Atlantic HMS tournaments by year and area (2005-2015). *As of November 2015. Source: NMFS Atlantic HMS Tournament Registration Database

Figure 3.10 shows the average distribution of HMS fishing tournaments among the coastal states of the Atlantic and Gulf of Mexico, as well as the U.S. Caribbean, based on data from 2005-2015.

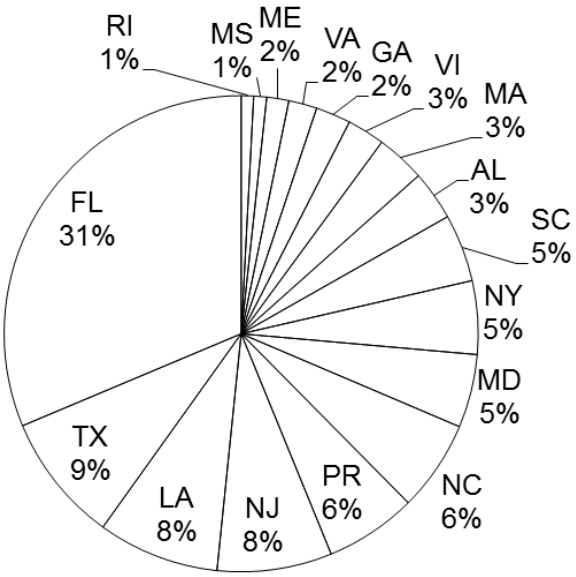

Figure 3.10 Percentage of Atlantic HMS tournaments held in each state (2002-2015). Areas excluded (< 1%) are Bermuda (0.03%), Connecticut (0.1%), Delaware (0.24%), and the Bahamas (0.5%). Source: NMFS Atlantic HMS Tournament Registration Database.

Table 3.28 indicates the number of HMS tournaments in 2013 and 2014 that registered to award points or prizes for the catch or landing of each HMS. Figure 3.11 shows that sailfish, blue marlin, yellowfin tuna, and white marlin are the predominant target species in HMS fishing tournaments.

Table 3.28 Number of Atlantic HMS tournaments by species (2013 & 2014). Source: NMFS Atlantic HMS Tournament Registration Database.

Species	2013	2014
Blue marlin	142	153
White marlin	128	138
Longbill spearfish	43	52
Roundscale spearfish	43	44
Sailfish	138	158
Swordfish	42	74
Bluefin tuna	36	96
Bigeye tuna	63	81
Albacore tuna	36	49
Yellowfin tuna	101	164
Skipjack tuna	30	33
Pelagic sharks	69	72
Small coastal sharks	16	19
Non-ridgeback sharks	16	17
Ridgeback sharks	11	12

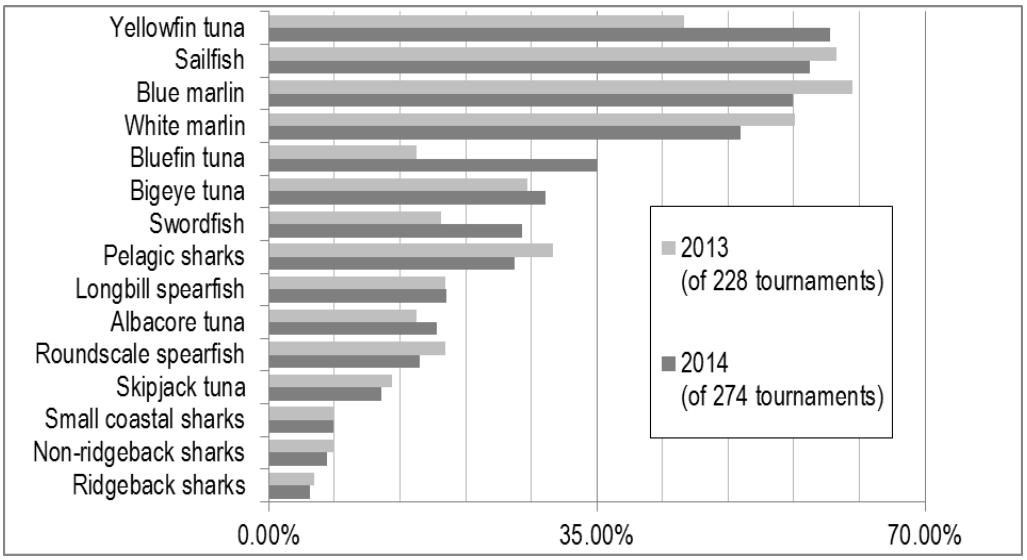

Figure 3.11 Percent of HMS tournaments by species (2013 & 2014). Source: NMFS Atlantic HMS Tournament Registration Database.

3.6 Economic Status of HMS Fisheries

Development of each rule, and of Atlantic HMS fisheries as a whole, is facilitated when there is an economic baseline against which the rule or fishery may be evaluated. In this analysis, NMFS used the past ten years of data to facilitate the analysis of trends. It also should be noted that all dollar figures are reported in nominal dollars (*i.e.*, current dollars). If analysis of real dollar (*i.e.*, constant dollar) trends controlled for inflation is desired, price indexes for 2007 to 2015 are provided in Table 3.29. To determine the real price in base year dollars, divide the base year price index by the current year price index, and then multiply this result by the price that is being adjusted for inflation.

Table 3.29 Inflation Price Indexes. Note: The CPI-U is the standard Consumer Price Index for all urban consumers (1982-1984=100) produced by U.S. Department of Labor Bureau of Labor Statistics. The source of the Producer Price Index (PPI) for unprocessed finfish (1982=100) is also the Bureau of Labor Statistics. The Gross Domestic Product Implicit Price Deflator (2009=100) is produced by the U.S. Department of Commerce Bureau of Economic Analysis.

Year	CPI-U	GDP Deflator	PPI Unprocessed Finfish
2007	207.3	97.3	318.1
2008	215.3	99.2	301.6
2009	214.5	100.0	306.9
2010	218.1	101.2	381.5
2011	224.9	103.3	388.1
2012	229.6	105.2	367.4
2013	233.0	106.7	438.2
2014	236.7	108.7	525.6
2015	237.0	109.8	610.2

3.6.1 Commercial Fisheries

All of the information and data presented in this section were obtained from the publication, "Fisheries of the United States, 2014" (NMFS 2015a). In 2014, 9.5 billion pounds valued at $5.4 billion were landed for all fish species by U.S. fisherman at U.S. ports. In 2013, 9.9 billion pounds valued at $5.5 billion were landed for all fish species by U.S. fisherman at U.S. ports. The overall value of landings between 2013 and 2014 decreased by 0.8 percent. The total value of commercial HMS landings in 2015 was $35.9 million. For a summary of all pricing, see Section 5.1 of the 2015 SAFE Report (NMFS 2015c).

3.6.1.1 Ex-Vessel Prices

The average ex-vessel prices per pound dw for 2007 to 2015 for Atlantic HMS by area are summarized in Table 3.30. In this table, prices are reported in nominal dollars. The ex-vessel price depends on a number of factors including the quality of the fish (*e.g.*, freshness, fat content, method of storage), the weight of the fish, the supply of fish, and consumer demand.

3.6.1.2 Revenues

Table 3.31 summarizes the average annual revenues of the Atlantic HMS fisheries based on average ex-vessel prices. Data for Atlantic HMS landings weight is as reported per eDealer in 2013 through 2015, the U.S. National Report (NMFS 2015a), the information used in the shark stock assessments, information given to ICCAT (Cortés pers. comm., 2015), as well as price and weight reported to the NMFS Northeast Regional Office by Atlantic bluefin tuna dealers. These values indicate that the estimated total annual revenue of Atlantic HMS fisheries has decreased in 2015 to $35.9 million from $42.3 million in 2014. From 2014 to 2015, the Atlantic tuna fishery's total revenue decreased by $2.9 million. A majority of that increase can be attributed to the decreases in commercial landings of yellowfin tuna. From 2014 to 2015, the annual revenues for the shark fisheries increased by $174 thousand. Finally, the annual revenues for swordfish declined by $3.7 million from 2014 to 2015 due to a decrease in landings and ex-vessel price.

Table 3.30 Average ex-vessel prices per pound for Atlantic HMS by area (2007-2015). Sources: HMS eDealer, Dealer weighout slips from the Southeast Fisheries Science Center (SEFSC), Northeast Fisheries Science Center (NEFSC). Gulf of Mexico includes: TX, LA, MS, AL, and the west coast of FL. S. Atlantic includes: east coast of FL. GA, SC, and NC dealers reporting to SEFSC. Mid-Atlantic includes: NC dealers reporting to NEFSC, VA, MD, DE, NJ, NY, and CT. N. Atlantic includes: RI, MA, NH, and ME. For bluefin tuna, all NC landings are included in Mid-Atlantic.

Species	Area	2007	2008	2009	2010	2011	2012	2013	2014	2015
Bigeye tuna	Gulf of Mexico	$5.66	$6.12	$5.80	$5.79	$5.64	$6.19	$3.18	$3.54	$5.57
	S. Atlantic	4.34	4.34	4.11	4.03	4.73	4.75	5.14	5.25	5.01
	Mid-Atlantic	5.48	5.70	5.42	5.86	6.38	6.90	6.35	6.66	5.89
	N. Atlantic	5.31	5.60	5.18	4.79	5.39	5.67	5.49	5.25	4.78
Bluefin tuna	Gulf of Mexico	5.63	4.51	4.65	5.42	6.38	7.16	6.72	6.49	5.75
	S. Atlantic	11.16	13.29	14.43	8.75	7.34	8.20	7.52	8.06	7.27
	Mid-Atlantic	6.95	7.94	10.10	8.94	10.64	10.95	9.02	7.66	7.20
	N. Atlantic	8.31	8.31	7.06	8.38	10.21	11.57	8.60	7.87	6.37
Yellowfin tuna	Gulf of Mexico	3.02	3.51	3.04	3.72	3.65	3.51	3.65	3.86	4.04
	S. Atlantic	2.69	2.99	2.90	3.53	3.93	4.63	3.64	3.69	3.43
	Mid-Atlantic	2.99	3.30	2.50	3.43	3.45	4.46	4.72	4.53	4.09
	N. Atlantic	3.17	3.82	2.86	2.80	3.39	4.22	3.89	3.52	3.18
Albacore tuna	Gulf of Mexico	0.53	0.49	0.55	1.40	1.09	0.68	0.77	0.77	0.78
	S. Atlantic	1.24	1.21	1.29	1.36	1.42	1.64	2.06	1.86	1.70
	Mid-Atlantic	0.86	0.97	1.10	1.30	1.19	1.25	1.41	1.27	1.36
	N. Atlantic	1.37	2.00	1.26	1.56	1.55	1.34	1.80	1.20	1.34
Skipjack tuna	Gulf of Mexico	-	-	0.50	-	0.90	0.75	-	-	-
	S. Atlantic	0.73	0.95	0.95	1.13	1.25	1.10	0.80	0.75	0.68
	Mid-Atlantic	2.22	4.50	-	-	0.60	1.06	0.88	1.12	0.72
	N. Atlantic	-	-	-	-	-	-	0.93	-	-
Swordfish	Gulf of Mexico	3.07	2.93	2.69	3.53	4.15	3.42	3.46	3.42	2.97
	S. Atlantic	4.24	4.11	4.12	4.63	4.84	4.97	4.99	4.85	4.31
	Mid-Atlantic	4.07	3.50	3.40	4.43	4.44	4.51	4.45	4.66	3.87
	N. Atlantic	4.11	4.20	3.49	4.61	4.22	4.49	4.61	4.43	3.25
Large coastal sharks	Gulf of Mexico	0.42	0.67	0.52	0.48	0.38	0.40	0.46	0.52	0.53
	S. Atlantic	0.54	0.72	0.55	0.65	0.61	0.75	0.77	0.72	0.77
	Mid-Atlantic	0.56	0.71	0.57	0.64	0.54	0.67	0.65	0.78	0.74
	N. Atlantic	-	-	-	-	-	-	-	-	-
Pelagic sharks	Gulf of Mexico	1.29	1.18	1.25	1.47	1.54	1.33	1.45	1.31	1.58
	S. Atlantic	1.29	1.29	1.25	1.27	1.46	1.74	1.66	1.47	1.55
	Mid-Atlantic	1.06	1.20	1.16	1.19	1.30	1.39	1.69	1.37	1.16
	N. Atlantic	0.85	0.96	1.23	1.28	1.48	1.68	2.03	2.00	1.68
Small coastal sharks	Gulf of Mexico	0.58	0.62	0.69	0.55	0.58	0.66	0.33	0.37	0.36
	S. Atlantic	0.80	0.78	0.71	0.79	0.81	0.99	0.71	0.74	0.76
	Mid-Atlantic	0.43	0.48	0.57	0.57	0.59	0.68	0.83	0.80	0.81
	N. Atlantic	-	-	-	-	-	-	-	-	-
Shark fins	Gulf of Mexico	13.22	14.94	15.09	16.48	15.11	14.97	11.05	9.75	10.10
	S. Atlantic	11.44	12.73	13.15	15.35	14.91	11.00	6.04	9.57	10.04
	Mid-Atlantic	6.12	3.74	3.62	6.83	3.50	2.79	1.45	1.77	1.95
	N. Atlantic	3.24	3.00	3.67	2.40	1.60	1.86	1.90	-	0.80

Table 3.31 Estimates of the total ex-vessel annual revenues of Atlantic HMS fisheries (2007-2015).

Species		2007	2008	2009	2010	2011	2012	2013	2014	2015
Bigeye tuna	Ex-vessel $/lb dw	$5.20	$5.26	$5.09	$5.22	$5.77	$6.42	$5.72	$5.79	$5.35
	Weight lb dw	706,361	736,520	774,087	799,934	1,122,619	1,039,585	851,669	1,063,914	1,129,017
	Fishery revenue	$3,673,077	$3,874,095	$3,940,103	$4,175,655	$6,477,512	$6,674,136	$4,673,419	$5,716,850	$5,454,461
Bluefin tuna	Ex-vessel $/lb dw	$8.63	$9.35	$8.18	$8.35	$10.08	$11.15	$8.58	$7.84	$6.45
	Weight lb dw	515,176	720,823	899,477	1,119,937	996,661	995,583	682,533	1,002,549	1,347,920
	Fishery revenue	$4,445,969	$6,739,695	$7,357,722	$9,351,474	$10,046,343	$11,100,750	$5,826,566	$7,810,287	$8,716,613
Yellowfin tuna	Ex-vessel $/lb dw	$2.90	$3.22	$2.87	$3.52	$3.60	$4.16	$3.91	$3.96	$3.71
	Weight lb dw	4,521,240	2,423,498	3,159,665	2,154,728	2,676,682	4,349,482	2,580,759	2,779,487	1,965,050
	Fishery revenue	$13,111,596	$7,803,664	$9,068,239	$7,584,643	$9,636,055	$18,093,845	$11,214,871	$11,833,261	$8,494,781
Skipjack tuna	Ex-vessel $/lb dw	$0.75	$1.01	$0.91	$1.13	$1.17	$1.06	$0.85	$0.98	$0.72
	Weight lb dw	26,455	32,628	30,688	16,269	12,931	17,804	3,857	17,919	3,421
	Fishery revenue	$19,793	$32,950	$28,057	$18,451	$15,164	$18,949	$3,204	$14,478	$2,269
Albacore tuna	Ex-vessel $/lb dw	$0.97	$1.15	$1.11	$1.36	$1.29	$1.31	$1.70	$1.49	$1.46
	Weight lb dw	244,272	216,759	291,187	290,827	491,133	489,800	402,400	554,428	409,210
	Fishery revenue	$237,681	$248,400	$324,439	$394,754	$632,450	$639,370	$583,230	$800,870	$593,911
Total tuna	Fishery revenue	$21,488,116	$18,698,804	$20,718,559	$21,524,977	$26,807,524	$36,527,050	$22,301,290	$26,175,746	$23,262,035
Swordfish	Ex-vessel $/lb dw	$3.99	$3.68	$3.46	$4.40	$4.50	$4.41	$4.66	$4.65	$4.07

	Weight lb dw	3,643,926	3,414,513	3,762,280	3,676,324	4,473,140	5,561,605	4,099,851	2,952,835	2,576,537
	Fishery revenue	$14,544,604	$12,577,768	$13,031,079	$16,186,878	$20,130,595	$24,534,334	$19,178,743	$13,887,650	$10,175,662
Large coastal sharks	Ex-vessel $/lb dw	$0.48	$0.70	$0.54	$0.60	$0.53	$0.59	$0.64	$0.65	$0.66
	Weight lb dw	2,329,272	1,451,423	1,532,969	1,566,741	1,469,142	1,445,597	1,392,440	1,368,178	1,593,989
	Fishery revenue	$1,122,051	$1,009,138	$828,003	$938,044	$779,993	$854,916	$683,359	$764,162	$885,305
Pelagic sharks	Ex-vessel $/lb dw	$1.12	$1.21	$1.18	$1.23	$1.35	$1.43	$1.67	$1.48	$1.40
	Weight lb dw	262,179	234,546	225,575	312,195	314,314	314,084	247,833	353,623	215,298
	Fishery revenue	$294,036	$284,113	$266,548	$382,527	$425,831	$449,759	$384,419	$504,860	$323,129
Small coastal sharks	Ex-vessel $/lb dw	$0.70	$0.69	$0.69	$0.69	$0.75	$0.87	$0.54	$0.56	$0.57
	Weight lb dw	618,191	639,842	708,279	397,766	590,174	667,501	439,704	434,377	553,419
	Fishery revenue	$432,816	$440,108	$488,374	$272,590	$441,269	$578,126	$275,346	$342,887	$410,305
Shark fins*	Ex-vessel $/lb dw	$11.63	$12.43	$12.45	$14.02	$11.90	$8.96	$6.08	$7.71	$8.46
	Weight lb dw	160,482	116,291	123,341	113,835	118,682	121,359	150,853	110,560	105,189
	Fishery revenue	$1,865,900	$1,444,918	$1,535,469	$1,596,472	$1,412,129	$1,086,979	$738,189	$672,200	$839,642
Total sharks	Fishery revenue	$3,714,802	$3,178,277	$3,118,394	$3,189,633	$3,059,222	$2,969,779	$2,081,313	$2,284,109	$2,458,381
Total HMS	Fishery revenue	$39,747,522	$34,454,849	$36,868,033	$40,901,488	$49,997,341	$64,031,163	$43,561,346	$42,347,505	$35,896,078

* Shark fin total weight for 2007 through 2012 was estimated using 5% of all sharks landed. In 2013 and 2014, it was based on reported shark fin landings reported to eDealer. Sources: HMS eDealer Program, NMFS Northeast Commercial Fisheries Database Service; Pelagic Dealer Compliance Program; and NMFS, 2013.

A variety of fishing gears are used to pursue Atlantic HMS. Figure 3.12 displays the percent composition of the $35.9 million ex-vessel annual revenues landed in 2015 by fishing gear category. Based on eDealer and Atlantic bluefin tuna bi-weekly dealer report data, approximately 66 percent of 2015 total revenues in the HMS fisheries were landed by pelagic longline gear. In addition, 23 percent of landing by value were from vessels using commercial rod and reel gear, 3 percent from bottom longline gear, 2 percent from harpoon, and 6 percent from other gear categories. These other gear categories include gill net, purse seine, buoy gear, green-stick, hand line, and other miscellaneous gears.

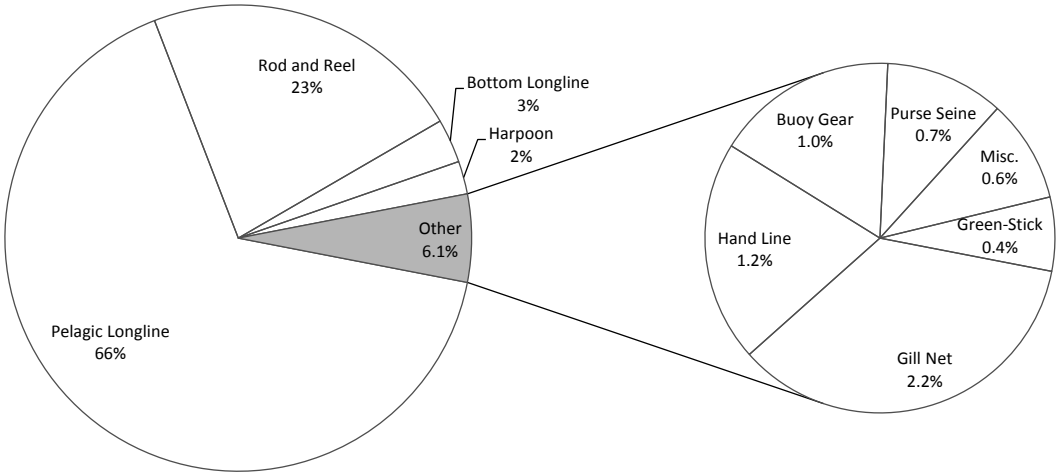

Figure 3.12 Percent of 2015 Total Ex-vessel Revenues of Atlantic HMS Fisheries By Gear. Sources: HMS eDealer and Atlantic bluefin tuna dealer reports from the HMS Management Division in the Greater Atlantic Region.

3.6.1.3 Operating Costs

NMFS has collected operating cost information from commercial permit holders via logbook reporting. Each year, 20 percent of active Atlantic HMS commercial permit holders are selected to report economic information along with their Atlantic HMS logbook or Coastal Fisheries logbook submissions. In addition, NMFS also receives voluntary submissions of the trip expense and payment section of the logbook form from non-selected vessels.

The primary expenses associated with operating an Atlantic HMS permitted PLL commercial vessel include labor, fuel, bait, ice, groceries, other gear, and light sticks on swordfish trips. Unit costs are collected on some of the primary variable inputs associated with trips. The unit costs for fuel, bait, and light sticks are reported in Table 3.32.

Fuel costs decreased over 31.1 percent from 2014 to 2015 while the cost per pound for bait decreased 13.5 percent from 2014 to 2015. The unit cost per light sticks has remained the same from 2014 to 2015.

Table 3.32 Pelagic Longline Vessel Median Unit Costs for Fuel, Bait, and Light Sticks (2007-2014).

Input Unit Costs ($)	2007	2008	2009	2010	2011	2012	2013	2014	2015
Fuel (per gallon)	2.31	3.50	2.00	2.50	3.40	3.50	3.35	3.25	2.24
Bait (per lb)	0.85	0.81	0.81	0.90	1.31	1.50	1.59	1.33	1.15
Light sticks (per stick)	0.36	0.37	0.37	0.25	0.25	0.30	0.30	0.30	0.30

Source: HMS Logbook.

Table 3.33 provides the median total cost per trip for the major variable inputs associated with Atlantic HMS trips taken by pelagic longline vessel. Fuel costs are one of the largest variable expenses. Total median pelagic longline vessel fuel costs per trip decreased 26.6 percent from 2014 to 2015.

Table 3.33 Median Input Costs for Pelagic Longline Vessel Trips (2007-2014).

Input Costs ($)	2007	2008	2009	2010	2011	2012	2013	2014	2015
Fuel	3,085	3,213	2,862	2,386	2,814	2,784	2,860	2,554	1,875
Bait	1,400	1,488	1,785	1,895	3,150	3,000	3,000	2,565	2,250
Light sticks	675	600	592	500	633	750	750	750	700
Ice costs	540	476	514	430	600	675	584	660	750
Grocery expenses	819	765	895	780	900	900	900	900	900
Other trip costs	1,500	1,762	1,671	1,500	1,622	1,289	1,200	500	610

Source: HMS Logbook.

Labor costs are also an important component of operating costs for HMS pelagic longline vessels. Table 3.34 lists the number of crew on a typical pelagic longline trip. The median number of crew members has been consistently three from 2007 to 2015. Most crew and captains are paid based on a lay system. According to Atlantic HMS logbook reports, owners are typically paid 50 percent of revenues. Captains receive a 25 percent share and crew in 2015 received 25 percent on average. These shares are typically paid out after costs are netted from gross revenues. Median total shared costs per trip on pelagic longline vessels have ranged from $6,000 to $9,949 from 2007 to 2015.

Table 3.34 Median Labor Inputs for Pelagic Longline Vessel Trips (2007-2015).

Labor	2007	2008	2009	2010	2011	2012	2013	2014	2015
Number of crew	3	3	3	3	3	3	3	3	3
Owner share (%)	47	45	47	50	50	50	50	50	50
Captain share (%)	20	20	20	23	23	25	23	25	25
Crew share (%)	15	20	25	25	25	28	25	25	25
Total shared costs ($)	6,000	6,608	6,500	7,295	9,949	8,266	8,032	6,699	6,629

Source: HMS Logbook.

In 2015, median reported total trip sales were $17,883. In 2014, median reported total trip sales were $17,898. After adjusting for operating costs, median net earnings per trip were $9,920 in 2014. Median net earnings per trip increased to $10,069 in 2015.

3.6.2 Recreational Fisheries

A report summarizing the results of the 2011 National Survey of Fishing, Hunting, and Wildlife-Associated Recreation was released in August 2012. This report, which is the 12th regarding a series of surveys that has been conducted about every 5 years since 1955, provides relevant information such as the number of anglers, expenditures by type of fishing activity, number of participants and days of participation by animal sought, and demographic characteristics of participants. The final national report and the data CD-ROM are available from the U.S. Fish and Wildlife Service (USFWS). More information on the 2011 national survey is available at http://www.fws.gov/pacific/news/news.cfm?id=2144375111.

In 2011, NMFS conducted the National Marine Recreational Fishing Expenditure Survey to collect national level data on trip and durable good expenditures related to marine recreational fishing, and estimate the associated economic impact (Lovell et al., 2013). Nationally, marine anglers were estimated to have spent $4.4 billion on trip related expenses (e.g., fuel, ice, and bait), and $19 billion on fishing equipment and durable goods (e.g., fishing rods, tackle, and boats). Using regional input-output models, these expenditures were estimated to have generated $56 billion in total economic impacts, and supported 364 thousand jobs in the United States in 2011.

This survey also included a separate survey of HMS Angling permit holders from the LPS region (Maine to Virginia) plus North Carolina (Hutt et al., 2014). Estimated trip-related expenditures and the resulting economic impacts for HMS recreational fishing trips are presented in Table 3.35.

For the HMS Angler Expenditure Survey, randomly selected HMS Angling permit holders were surveyed every two months, and asked to provide data on the most recent fishing trip in which they targeted HMS. Anglers were asked to identify the primary HMS they targeted, and their expenditures related to the trip. Of the 2,068 HMS anglers that returned a survey, 1,001 anglers indicated they targeted a species of tuna (i.e., bluefin, yellowfin, bigeye, or albacore tuna) on their most recent private boat trip, or simply indicated they fished for tuna in general without identifying a specific species. Of the rest of those surveyed, 88 reported on trips targeting billfish (i.e., blue marlin, white marlin, sailfish), 105 reported on trips targeting shark (i.e., shortfin mako, thresher shark, blacktip shark), and 874 either reported on trips that did not target HMS or failed to indicate what species they targeted. Average trip expenditures ranged from $534/trip for tuna trips to $900 for billfish trips. Boat fuel was the largest trip-related expenditure for all HMS trips, and made up about 73 percent of trip costs for billfish trips, which is not unexpected given the predominance of trolling as a fishing method for billfish species such as marlin. Total trip-related expenditures for 2011 were estimated by expanding average trip-related expenditures by estimates of total directed boat trips per species group from the LPS and MRIP. Total expenditures were then divided among the appropriate economic sectors, and entered into an input-output model to estimate total economic output and employment supported by the expenditures within the study region (coastal states from Maine to North Carolina). Overall,

$23.2 million of HMS angling trip-related expenditures generated approximately $31.3 million in economic output, and supported 216 full time jobs from Maine to North Carolina in 2011.

Table 3.35 HMS Recreational Fishing Trip Related Expenditures and Economic Impacts for Directed Trips.

Variable	Tuna Trips	Billfish Trips	Shark Trips	All HMS Trips
Sample size by species targeted	1,001	88	105	1,194
Average trip expenditures	$534	$900	$567	$587
Total directed HMS private boat trips *	27,648	5,123	6,669	39,440
Total trip-related expenditures	$14,775,000	$4,612,000	$3,781,000	$23,168,000
Total economic output	$19,864,000	$6,036,000	$5,443,000	$31,343,000
Employment (Full time job equivalents)	136	39	41	216

Sources: 2011 mail survey of Atlantic HMS Angling permit holders and Large Pelagics Survey (*).

In addition to collecting data on HMS angling trip expenditures and economic impacts, the 2011 expenditure survey also collected data on HMS angler expenditures on durable goods used for marine angling (i.e., boats, vehicles, tackle, electronics, second homes). HMS anglers were found to spend $10,410 on average for durable goods and services related to marine recreational fishing, of which $5,516 could be attributed to HMS angling (based on their ratio of HMS trips to total marine angling trips). The largest expenditures items for marine angler durable goods among HMS anglers were for new boats ($3,178), boat storage ($1,258), and boat maintenance ($1,085). HMS anglers were estimated to have spent a total of $76 million on durable goods for HMS angling which in turn were estimated to generate $116 million in economic output, and support 727 jobs from Maine to North Carolina in 2011 (Hutt et al., 2014).

On May 9, 2014, NMFS announced that it would conduct a National Marine Recreational Fishing Expenditure Survey. The survey was conducted in two parts. The first part of the survey collected information on expenditures and durable goods from randomly selected anglers with saltwater fishing licenses in coastal states. The second part of the survey, focusing on trip-related expenditures, will be conducted in 2016. The 2014 expenditure included a targeted survey of approximately 1,200 HMS Angling permit holders. Such a targeted survey will provide expenditure data on a unique group of anglers that are typically under-represented in national surveys.

The American Sportfishing Association (ASA) also has a report listing the 2006 economic impact of sportfishing on specific states (ASA 2008). This report states that all sportfishing (in both federal and state waters) has an overall economic importance of $125 billion dollars. ASA estimates 8,528,000 anglers participate in saltwater fishing. These saltwater anglers spent $11 billion in retail sales, resulting in 263,000 jobs and $9 billion in salaries, wages, and business earnings in 2006. Saltwater fishing contributed $30 billion of the overall economic impact estimated. Florida, Texas, South Carolina, and North Carolina are among the top ten states in terms of overall economic expenditures for both saltwater and freshwater fishing. Florida is also one of the top states in terms of economic impact of saltwater fishing with $3.0 billion in angler expenditures, $5.1 billion in overall economic impact, $1.6 billion in salaries and wages related to fishing, and 51,588 fishing related jobs (ASA 2008).

At the end of 2004 and 2012, NMFS collected market information regarding advertised charterboat rates. The analysis of this data focused on advertised rates for full day charters. Full day charters vary from 6 to 14 hours long with a typical trip being 10 hours. The average price for a full day boat charter was $1,053 in 2004 and $1,200 in 2012. Sutton et al., (1999) surveyed charterboats throughout Alabama, Mississippi, Louisiana, and Texas in 1998 and found the average charterboat base fee to be $762 for a full day trip. Holland et al. (1999) conducted a similar study on charterboats in Florida, Georgia, South Carolina, and North Carolina and found the average fee for full day trips to be $554, $562, $661, and $701, respectively. Comparing these two studies conducted in the late 1990s to the average advertised daily HMS charterboat rate in 2004 and 2012, it is apparent that there has been a significant increase in charterboat rates.

In 2013, NMFS conducted a logbook study to collect cost and earnings data on charter and headboat trips targeting HMS throughout the entire Atlantic HMS region (Maine to Texas) (Hutt and Silva, 2015). The HMS Cost and Earning Survey commenced in July 2013, and ended in November 2013. Data from the survey indicate that 47 percent of HMS Charter/Headboat permit that responded to the survey did not plan to take for-hire trips to target HMS from July to November of 2013.

The species groups most commonly targeted by HMS for-hire vessels varied by region and between charter and headboats (Table 3.36). Overall, the HMS most commonly targeted by charter boats were yellowfin tuna (45 percent), sailfish (37 percent), marlin (32 percent), and coastal sharks (32 percent). The reported percentages add to greater than 100 percent as most HMS for-hire trips targeted multiple species. This was especially true of trips targeting tuna or billfish species as the majority of these trips reported targeting at least two other species. The exception was HMS trips targeting coastal sharks with only 5 percent or fewer reporting targeting other species. Of the 19 headboat trips that reported targeting coastal sharks, none reported targeting any other species. The HMS most commonly targeted by headboats were yellowfin tuna (37 percent), bigeye tuna (45 percent), swordfish (34 percent), and coastal sharks (33 percent). In the North Atlantic region, the two HMS most commonly targeted by both charter and head boats were yellowfin tuna (57 percent, 100 percent) and bigeye tuna (48 percent, 100 percent). The third HMS most commonly targeted species in the North Atlantic by charter boats were bluefin tuna (35 percent) which were not targeted on any reported headboat trips. HMS charters in the South Atlantic were most likely to report targeting sailfish (56 percent), yellowfin tuna (44 percent), and marlin (40 percent). In the Gulf of Mexico, HMS charter and head boats were most likely to report targeting coastal sharks (64 percent, 48 percent), yellowfin tuna (35 percent, 53 percent), and marlin (23 percent, 30 percent). For additional information see the study by Hutt and Silva (2015) and Section 5.4.3 of the 2015 SAFE Report (NMFS 2015c).

Table 3.36 Percent of HMS Charter/Headboat Trips by Region and Target Species (2013).

	N. Atlantic		S. Atlantic		Gulf of Mexico		Overall	
Party Size	**CH**	**HB**	**CH**	**HB**	**CH**	**HB**	**CH**	**HB**
Bluefin tuna	35.0	0.0	3.0	-	0.0	3.0	9.0	2.0
Yellowfin tuna	57.0	100.0	44.0	-	35.0	53.0	45.0	67.0
Albacore tuna	14.0	89.0	6.0	-	0.0	0.0	7.0	28.0
Bigeye tuna	48.0	100.0	2.0	-	5.0	20.0	12.0	45.0
Skipjack tuna	3.0	0.0	10.0	-	2.0	0.0	7.0	0.0
Marlin	14.0	17.0	40.0	-	23.0	30.0	32.0	26.0
Swordfish	13.0	89.0	3.0	-	10.0	10.0	6.0	34.0
Sailfish	0.0	0.0	56.0	-	15.0	10.0	37.0	7.0
Pelagic sharks	27.0	6.0	0.0	-	0.0	8.0	5.0	7.0
Coastal sharks	7.0	0.0	30.0	-	64.0	48.0	32.0	33.0
Other species	11.0	83.0	40.0	-	14.0	13.0	30.0	34.0

North Atlantic includes: RI, MA, NH, and ME. Mid-Atlantic includes: CT, NY, NJ, DE, MD, and VA. South Atlantic includes: NC, SC, and GA. Gulf of Mexico includes: AL, MS, LA, and TX. Florida was reported separately as currently available data did not permit separating Atlantic and Gulf of Mexico trips. * Percentages exceed 100 percent as most trips targeted multiple species.

For detailed information about HMS tournaments, please see Sections 4.4.2 (landings) and 8.1 (HMS tournament characterization) of the 2015 SAFE Report (NMFS 2015c), the 2011 SAFE Report (NMFS 2011a), and the 2006 Consolidated HMS FMP (NMFS 2006a).

3.7 Community and Social Update

According to National Standard 8, conservation and management measures should, consistent with conservation requirements, "take into account the importance of fishery resources to fishing communities by utilizing economic and social data [based on the best available information] in order to (A) provide for the sustained participation of such communities, (B) to the extent practicable, minimize adverse economic impacts on such communities." The information presented here addresses new data concerning the social and economic well-being of participants in the fishery and considers the impact of significant regulatory measures enacted in the past year.

3.7.1 Overview of Current Information and Rationale

The Magnuson-Stevens Act requires, among other things, that all FMPs include a fishery impact statement intended to assess, specify, and describe the likely effects of the measures on fishermen and fishing communities (§303(a)(9)).

NEPA also requires federal agencies to consider the interactions of natural and human environments by using a "systematic, interdisciplinary approach which will ensure the integrated use of the natural and social sciences...in planning and decision-making" (§102(2)(A)). Moreover, agencies need to address the aesthetic, historic, cultural, economic, social, or health effects, which may be direct, indirect, or cumulative. Consideration of social impacts is a growing concern as fisheries experience increased participation and/or declines in stocks. The

consequences of management actions need to be examined to better ascertain and, if necessary and possible, mitigate regulatory impacts on affected constituents.

Social impacts are generally the consequences to human populations resulting from some type of public or private action. Those consequences may include alterations to the ways in which people live, work or play, relate to one another, and organize to meet their needs. In addition, cultural impacts, which may involve changes in values and beliefs that affect people's way of identifying themselves within their occupation, communities, and society in general are included under this interpretation. Social impact analyses help determine the consequences of policy action in advance by comparing the status quo with the projected impacts. Community profiles are an initial step in the social impact assessment process. Although public hearings and scoping meetings provide input from those concerned with a particular action, they do not constitute a full overview of the fishery.

The Magnuson-Stevens Act outlines a set of NSs that apply to all fishery management plans and the implementation of regulations. Specifically, NS 8 notes that:

> "Conservation and management measures, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities by utilizing economic and social data that meet the requirements of paragraph (2), in order to: (A) provide for the sustained participation of such communities; and, (B) to the extent practicable, minimize adverse economic impacts on such communities." (§301(a)(8)). See also 50 CFR §600.345 for NS 8 Guidelines.

"Sustained participation" is defined to mean continued access to the fishery within the constraints of the condition of the resource (50 CFR §600.345(b)(4)). It should be clearly noted that NS 8 "does not constitute a basis for allocation of resources to a specific fishing community nor for providing preferential treatment based on residence in a fishing community" (50 CFR §600.345(b)(2). The Magnuson-Stevens Act further defines a "fishing community" as:

> " ... a community that is substantially dependent upon or substantially engaged in the harvest or processing of fishery resources to meet social and economic needs, and includes fishing vessel owners, operators, crew, and fish processors that are based in such communities." (§3(16))

NMFS (2001) guidelines for social impact assessments specify that the following elements are utilized in the development of FMPs and FMP amendments:

1. The size and demographic characteristics of the fishery-related work force residing in the area; these determine demographic, income, and employment effects in relation to the work force as a whole, by community and region.

2. The cultural issues of attitudes, beliefs, and values of fishermen, fishery-related workers, other stakeholders, and their communities.

3. The effects of proposed actions on social structure and organization; that is, on the ability to provide necessary social support and services to families and communities.

4. The non-economic social aspects of the proposed action or policy; these include life-style issues, health and safety issues, and the non-consumptive and recreational use of living marine resources and their habitats.

5. The historical dependence on and participation in the fishery by fishermen and communities, reflected in the structure of fishing practices, income distribution and rights.

From the 255 communities identified as involved in the 2001 commercial fishery, Amendment 1 to the 1999 FMP for Atlantic Tunas, Swordfish and Sharks focused on specific towns based on shark landings data, the size of the shark fishing fleet, the relationship between the geographic communities and the fishing fleets, and the existence of other community studies (NMFS 2003). While the recreational fishery is an important component in the shark fishery, participation and landings were not documented in a manner that allowed community identification. Wilson, *et al*. (1998), selected only the recreational fisheries found within the commercial fishing communities for a profile due to the lack of community-based data for the sport fishery. The study also investigated the social and cultural characteristics of fishing communities in five states and one U.S. territory: Massachusetts, New Jersey, North Carolina, Florida, Louisiana, and Puerto Rico. These areas were selected because they each had important fishing communities that could be affected by the 1999 FMP and Atlantic Billfish Amendment, and because they are fairly evenly spread along the Atlantic and Gulf coasts and the Caribbean

The 2006 Consolidated HMS FMP used information from the Wilson *et al*. (1998) study along with information gathered under the contract with the Virginia Institute of Marine Science (VIMS) at the College of William and Mary to re-evaluate several of the baseline communities (Kirkley, 2005). The VIMS study gathered a profile of basic sociological information for the principal states involved with the Atlantic shark fishery. A detailed description of additional information used in the community profiles analysis can be found in Section 9.2.2 of the 2006 Consolidated HMS FMP (NMFS 2006a).

As of October 2015, 79 percent of shark permits are held in Florida, Louisiana, New Jersey, and North Carolina (Table 3.26). Communities in these states are expected potentially to be the most affected by the measures proposed in Amendment 5b. In addition to the community profile information found in the 2006 Consolidated HMS FMP, a report by MRAG Americas, Inc. and Jepson (2008) titled "Updated Profiles for HMS Dependent Fishing Communities" can be found in Appendix E of Amendment 2 to the 2006 Consolidated HMS FMP (NMFS 2008a) and in Section 6 of the 2008 SAFE Report (NMFS 2008d). This report includes updated community profiles and new social impacts assessments for HMS fishing communities along the Atlantic and Gulf of Mexico coasts. Community profile information along with demographic information from the 1990, 2000, and 2010 U.S. Census can be found in the 2011 and 2012 SAFE Reports (NMFS 2011a; NMFS 2012). Jepson and Colburn (2013) developed social indicators of vulnerability and resilience for 25 communities in the U.S. southeast and northeast regions selected for having a greater than average number of HMS permits associated with them. This

report is described in detail in Chapter 9.0. Please also refer to the Economic Evaluation in Chapter 6.0, the Regulatory Impact Review (RIR) in Chapter 7.0, and the Initial Regulatory Flexibility Analysis (IRFA) in Chapter 8.0. Furthermore, each of the management alternatives in Chapter 4 includes an assessment of the potential social and economic impacts associated with the proposed alternatives.

3.8 International Trade and Fish Processing

United States participation in shark and all HMS related international trade programs, as well as a review of trade activity, is discussed in this section. This section also includes a review of the available information on the processing industry for shark species.

The United States collects general trade monitoring data through the U.S. Bureau of Customs and Border Protection (CBP; imports) and the U.S. Bureau of the Census (Census Bureau; exports and imports). These programs collect data on the amount and value of imports and exports categorized under the Harmonized Tariff Schedule (HTS). Many HMS have distinct HTS codes, and some species are further subdivided by product (e.g., fresh or frozen, fillets, steaks). NMFS provides Census Bureau trade data for all marine fish products online for the public at http://www.st.nmfs.noaa.gov/commercial-fisheries/foreign-trade/. Shark species are grouped together, which can limit the value of these data for fisheries management when species-specific information is needed. Often the utility of these data are further limited if the ocean area of origin for each product is not distinguished.

Trade data for Atlantic HMS, including shark species, are more useful as a conservation tool when they include more detailed information, such as the flag of the harvesting vessel, the ocean of origin, and the species for each transaction. Under the authority of ATCA and the Magnuson-Stevens Act, NMFS collects this more detailed information through catch and statistical document programs while monitoring international trade of bluefin tuna, swordfish, southern bluefin tuna, and frozen bigeye tuna. These trade programs implement ICCAT recommendations and support rebuilding efforts by collecting data necessary to identify nations and individuals that may be fishing in a manner that diminishes the effectiveness of ICCAT fishery conservation and management measures. In support of these programs, NMFS implemented the HMS International Trade Permit (ITP) in 2005 (69 FR 67268, November 17, 2004) to identify importers and exporters of HMS products that require trade monitoring documentation. Traders of shark fins must also be permitted. Copies of the ITP application and all trade monitoring documents associated with these programs are found on the HMS Management Division webpage at http://www.nmfs.noaa.gov/sfa/hms/. As of September 2016, there are 272 ITP holders distributed among 25 U.S. states and territories (NMFS 2015c).

Species listed on CITES Appendix II are those that are vulnerable to overexploitation, but not at risk of extinction. In every case of an import or export of an Appendix II species, an export/import permit may only be issued if, the export/import will not be detrimental to the survival of the species, the specimen was legally acquired (in accordance with the national wildlife protection laws) and any live specimen will be shipped in a manner which will not cause it any damage. During the sixteenth meeting of the Conference of Parties to CITES (CoP16), the United States and Brazil cosponsored a successful Columbian proposal to list oceanic whitetip

shark under Appendix II. The United States cosponsored this listing because of concerns that over-exploitation to supply the international fin trade negatively affects the population status of this species. Three species of hammerhead shark (scalloped, smooth, and great) were also added to Appendix II during CoP16, where they joined previously listed whale, basking, and great white sharks, along with oceanic whitetip shark. These Appendix II listings were effective September 14, 2014.

On June 27, 2012, the CITES Secretariat sent a Notification to the Parties regarding the inclusion of two shark species, scalloped hammerhead (*Sphyrna lewini*) and porbeagle (*Lamna nasus*), in CITES Appendix III. Their inclusion in Appendix III requires member parties to issue CITES permits or certificates for the import, export, and re-export of these species (or any of their parts or products). It also means that any U.S. import, export, or re-export of these species requires a declaration to and clearance from the U.S. Fish and Wildlife Service. In accordance with provisions of Article XVI, paragraph 2 of the CITES Convention, the inclusion of these species in Appendix III took effect 90 days after the Notification (i.e., effective as of September 25, 2012).

Regional fishery management organizations (RFMOs), including ICCAT, have taken steps to improve collection of international trade data to further international conservation policy for management of some shark species. While RFMOs use trade data to assess stock status, this information can be used to provisionally estimate landings related to these fisheries, and to identify potential compliance problems with certain ICCAT management measures.

Landings of dusky sharks have been prohibited in the United States since 2000. Because it is illegal to retain or land dusky sharks, any domestic or international trade of fins or meat for this species would also be prohibited. For more information regarding U.S. imports and exports of HMS, please see Section 5.3 of the 2015 SAFE Report (NMFS 2015c).

3.9 Bycatch, Incidental Catch, and Protected Species

"Bycatch" in fisheries is a term that generally refers to discarded fish or interactions between fishing operations and protected species. There are legal requirements pertaining to bycatch under the MSA, and the Endangered Species Act and the Marine Mammal Protection Act create additional important bycatch-related responsibilities. Information on bycatch, incidental catch, and interactions with protected species in HMS fisheries is summarized annually in the HMS SAFE Report (NMFS 2011a; NMFS 2015c), and the effectiveness of bycatch reduction measures is evaluated based on this summary, and other available data.

In February 2016, NMFS issued for public comment a draft *National Bycatch Reduction Strategy* that aims to coordinate NMFS' efforts to address bycatch under the various mandates. *See* *http://www.nmfs.noaa.gov/sfa/fisheries_eco/bycatch/docs/national-bycatch-strategy-2-23-16-web.pdf* . NMFS also issued a second update of its U.S. National Bycatch Report, which provides a compilation of data and national and regional overviews of bycatch in fisheries. *See* https://www.st.nmfs.noaa.gov/Assets/Observer-Program/bycatch-report-update-2/NBR%20First%20Edition%20Update%202_Final.pdf at 9 (including data from 2011-2013). NMFS does not use the National Bycatch Report for day-to-day management of fisheries.

3.9.1 Bycatch Reduction and the Magnuson-Stevens Act

Under the Magnuson-Stevens Act, "bycatch" has a very specific meaning: "fish which are harvested in a fishery, but which are not sold or kept for personal use, and includes economic discards and regulatory discards. Such term does not include fish released alive under a recreational catch and release fishery management program." 16 U.S.C. 1802(2). Fish is defined as finfish, mollusks, crustaceans, and all other forms of marine animal and plant life other than marine mammals and birds. 16 U.S.C. 1802(12). Birds and marine mammals are therefore not considered bycatch under the Magnuson-Stevens Act.

National Standard 9 of the Magnuson-Stevens Act requires that fishery conservation and management measures shall, to the extent practicable, minimize bycatch and minimize the mortality of bycatch that cannot be avoided. 16 U.S.C. 1851(a)(9). In many fisheries, it is not practicable to eliminate all bycatch and bycatch mortality. Some relevant examples of fish caught in Atlantic HMS fisheries that are included as bycatch or incidental catch are marlin, undersized swordfish, and bluefin tuna caught and released by commercial fishing gear; undersized swordfish and tunas in recreational hook and line fisheries; species for which there is little or no market such as blue sharks; species caught and released in excess of a bag limit; and species in the prohibited shark complex.

A number of options are currently employed (*) or available for bycatch reduction in Atlantic HMS fisheries. These include but are not limited to:

Commercial

1. *Gear Modifications (including hook and bait types)
2. *Circle Hooks
3. *Weak Hooks
4. *Time/Area Closures
5. Performance Standards
6. *Education/Outreach
7. *Effort Reductions (*i.e.*, Limited Access)
8. Full Retention of Catch
9. *Use of De-hooking Devices (mortality reduction only)
10. *Prohibiting retention of fish

Recreational

1. *Use of Circle Hooks (mortality reduction only)
2. Use of De-hooking Devices (mortality reduction only)
3. Full Retention of Catch
4. *Formal Voluntary or Mandatory Catch-and-Release Program for all Fish or Certain Species
5. Time/Area Closures
6. *Prohibiting retention of fish

There are probably no fisheries in which there is zero bycatch because none of the currently legal fishing gears are perfectly selective for the target of each fishing operation (with the possible exception of the swordfish/tuna harpoon fishery and speargun fishery). Therefore, to totally eliminate bycatch of all non-target species in Atlantic HMS fisheries would be impractical. The goal then is to minimize the amount of bycatch to the extent practicable and minimize the mortality of species caught as bycatch.

3.9.2 Standardized Reporting of Bycatch

Section 303(a)(11) of the MSA requires all FMPs to "establish a standardized reporting methodology to assess the amount and type of bycatch occurring in the fishery" (16 U.S.C. § 1853(11)). The scope of the Standardized Bycatch Reporting Methodology (SBRM) requirement is limited to the MSA definition of "bycatch." *See* Section 1.1.1 for definition. NMFS is not modifying its SBRM for HMS fisheries in this amendment. Requirements pertaining to the collection, reporting and recording of bycatch data are set forth in the 2006 Consolidated HMS FMP and subsequent amendments and their implementing regulations. NMFS provides an overview of SBRM in HMS fisheries through 2010 in its 2011 SAFE Report (NMFS 2011a), and an updated overview of SBRM, including observer coverage rates, in Chapter 4 of the 2015 SAFE Report (NMFS 2015c).

In the following sub-sections, NMFS summarizes data collection, reporting, and recording requirements for PLL, BLL and recreational fishing vessels. Bycatch data are collected with respect to fishing gear type. The number and location of discarded fish are recorded, as is the disposition of the fish (i.e., released alive vs. released dead). Post-release mortality of HMS is accounted for in stock assessments to the extent that the data allow.

3.9.2.1 U.S. Atlantic Pelagic Longline Fishery

NMFS utilizes both self-reported logbook data and observer data to monitor bycatch in the PLL fishery. The incidental catch of bluefin tuna in the pelagic longline fishery is also monitored via electronic monitoring (camera array) and vessel monitoring systems.

Logbooks (Fisheries Logbook System or FLS, and the supplemental discard report form in the reef fish/snapper-grouper/king and Spanish mackerel/shark logbook program) are mandatory, and reporting rates appear to be generally high (Garrison, 2005). Due to the management focus on HMS fisheries, there has been close monitoring of reporting rates, and observed trips can be directly linked to reported effort. In general, the gear characteristics and amount of observed effort is consistent with reported effort.

The observer program has been in place since 1992 to document finfish bycatch, characterize fishery behavior, and quantify interactions with protected species (Beerkircher *et al.*, 2002). Data collection priorities have been to collect catch and effort data of the U.S. Atlantic PLL fleet on HMS, although information is also collected on interactions with protected species. The program is mandatory for those vessels selected, and all vessels with directed and indirect swordfish permits are selected. The program had a target coverage level of five percent of the U.S. fleet within the North Atlantic (waters north of 5^{o} N. latitude), as was agreed to by the United States at ICCAT. Actual coverage levels achieved from 1992 – 2003 ranged from two to

nine percent depending on quarter and year. Observer coverage was 100 percent for vessels participating in the NED experimental fishery during 2001 – 2003. Overall observer coverage in 2003 was 11.5 percent of the total sets made, including the NED experiment. The program began requiring an eight percent coverage rate due to the requirements of the 2004 BiOp for Atlantic PLL Fishery for HMS (NMFS, 2004b). Observer coverage in 2005-07 ranged from 7.5 – 10.8 percent. NMFS increased the coverage of the longline fleet operating in the Gulf of Mexico during March/April through June for 2007-2010 to monitor bluefin tuna interactions, attempting 100 percent observer coverage from 2007-2009 and 50 percent since 2010. NMFS increased mandatory observer coverage for pelagic longline vessels in the Mid-Atlantic Bight, including the Cape Hatteras Gear Restricted Area, from December 1, 2015 through April 30, 2016. Expanding observer coverage in this area will help scientists better understand bluefin tuna stock structure, biology and behavior, and assist in the rebuilding of the stock.

Fishery observer effort is allocated among eleven large geographic areas and calendar quarter based upon the historical fishing range of the fleet (Walsh and Garrison, 2006). The target annual coverage is eight percent of the total reported sets, and observer coverage is randomly allocated based upon reported fishing effort during the previous fishing year/quarter/statistical reporting area (Beerkircher *et al.*, 2002). Bycatch rates of protected species (catch per 1,000 hooks) are quantified based upon observer data by year, fishing area, and quarter (Garrison, 2005). The estimated bycatch rate is then multiplied by the fishing effort (number of hooks) in each area and quarter reported to the FLS program to obtain estimates of total interactions for each species of marine mammal and sea turtle (Garrison, 2005).

3.9.2.2 Recreational Handgear Fishery

The recreational landings database for Atlantic HMS consists of information obtained through surveys including the Marine Recreational Information Program (MRIP), Large Pelagics Survey (LPS), Southeast Headboat Survey (HBS), Texas Headboat Survey, Recreational Billfish Survey (RBS) tournament data, and the HMS Recreational Reporting Program (non-tournament swordfish, billfishes, and bluefin tuna) via http://hmspermits.noaa.gov/. Descriptions of these surveys, the geographic areas they include, and their limitations are discussed in the 2006 Consolidated HMS FMP (NMFS 2006a) and HMS SAFE Reports.

Historically, fishery survey strategies (including the MRIP, LPS, and RBS) have not captured all landings of recreationally-caught swordfish. Although some swordfish handgear fishermen have commercial permits, many others land swordfish strictly for personal consumption; therefore, NMFS has implemented regulations to improve recreational swordfish and billfish monitoring and conservation. These regulations stipulate that all non-tournament recreational landings of swordfish and billfish must be reported by phone at (800) 894-5528 or web portal at http://hmspermits.noaa.gov/. All reported recreational swordfish landings are counted toward the incidental swordfish quota. Reported domestic landings of Atlantic tunas and swordfish are presented in Section 4.4.2 of the 2015 SAFE Report (NMFS 2015c).

3.9.2.3 Bottom longline fishery

The shark BLL fishery has relatively low observed bycatch rates. Historically, finfish bycatch has averaged approximately five percent in the BLL fishery. Observed protected species bycatch (sea turtles) has typically been much lower, less than 0.01 percent of the total observed catch.

Disposition of discards is recorded by observers and in logbooks and these can be used to estimate discard mortality.

3.9.3 Bycatch Reduction in HMS Fisheries

The NMFS HMS bycatch reduction program includes an evaluation of current data collection programs, implementation of bycatch reduction measures such as gear modifications and time/area closures, and continued support of data collection and research relating to bycatch. Additional details on bycatch and bycatch reduction measures can be found in Section 3.5 of the 1999 FMP (NMFS 1999), Regulatory Amendment 1 to the 1999 FMP (NMFS 2000), Regulatory Adjustment 2 to the 1999 FMP (NMFS 2002), Amendment 1 to the 1999 FMP (NMFS 2003a), in the 2006 Consolidated HMS FMP (NMFS 2006a), and in HMS SAFE Reports. In addition, an HMS Bycatch Reduction Implementation Plan was developed in late 2003, which identified priority issues to be addressed in the following areas: 1) monitoring; 2) research; 3) management; and 4) education/outreach. Individual activities in each of these areas were identified and new activities may be added or removed as they are addressed or identified.

3.10 Bycatch Mortality, Protected Species Interactions, and Other Bycatch Reduction Measures

3.10.1 Bycatch Mortality

The reduction of bycatch mortality is an important component of National Standard 9. Physical injuries may not be apparent to the fisherman who is quickly releasing a fish because there may be injuries associated with the stress of being hooked or caught in a net. Little is known about the mortality rates of many of the species managed under this FMP, but there are some data for certain species. Information on bycatch mortality of these fish should continue to be collected, and in the future, could be used to estimate bycatch mortality in stock assessments. For a summary of bycatch species in BLL and PLL fisheries, please refer to Table 3.37, Table 3.38Table 3.39Table 3.40. For all other fisheries, please refer to Section 7.2 of the 2015 SAFE Report (NMFS 2015c).

NMFS submits annual data (Task II) to ICCAT on mortality estimates (dead discards). These data are included in the SAFE Reports and National Reports to ICCAT to evaluate bycatch trends in HMS fisheries.

Table 3.37 Summary of bycatch species in HMS fisheries, Marine Mammal Protection Act category, Endangered Species Act requirements, data collection, and management measures (year implemented) for the pelagic longline fishery.

Fishery/Gear Type	Bycatch Species	MMPA Category	ESA Requirements	Bycatch Data Collection	Management Measures
Pelagic Longline	Bluefin tuna Billfish Undersize target species Marine mammals Sea turtles Seabirds Non-target finfish Prohibited shark species Large Coastal Shark species after closure	Category I	Jeopardy findings in 2000 & 2004; Reasonable and Prudent Alternative implemented 2001-04; ITS, Terms & Conditions, RPMs; Consultation reinitiated in 2014	Permit requirement (1985); logbook requirement (SWO-1985; SHK - 1993); observer requirement (1992); EFPs (2001-present)	BFT target catch requirements (1981); quotas (SWO - 1985; SHK - 1993); prohibit possession of billfish (1988); minimum size (1995); gear marking (1999); line clippers, dipnets (2000); MAB closure (1999); limited access (1999); limit the length of mainline (1996-1997 only); move 1 nm after an interaction (1999); voluntary vessel operator workshops (1999); GOM closure (2000); FL, Charleston Bump, NED closures (2001); gangion length, corrodible hooks, de-hooking devices, handling & release guidelines (2001); NED experiment (2001-03); VMS (2003); circle hooks and bait requirements (2004); mandatory safe handling and release workshops (2006); sea turtle control device (2008); closed area research (2008-10); marine mammal handling and release placard, 20 nm mainline restriction in MAB, observer and research reqts in Cape Hatteras Spec. Research Area (CHSRA), increased obs coverage in Atl PLL fishery (2009), weak hook requirement in GOM (2011); Amendment 7 Individual Bluefin Quotas, Gear Restricted Areas, Electronic Monitoring, VMS reporting (2015)

MMPA – Marine Mammal Protection Act; ESA – Endangered Species Act; ITS – Incidental take statement; MRFSS – Marine Recreational Fishing Statistics Survey; EFPs – Exempted fishing permits; BFT – Bluefin tuna; SWO – Swordfish; SHK – Shark; GOM – Gulf of Mexico; NED – North East Distant; MAB – Mid Atlantic Bight; PLL – Pelagic longline; VMS – Vessel monitoring system.

Pelagic Longline Fishery

NMFS collects data on the disposition (released alive or dead) of bycatch species from logbooks submitted by fishermen in the pelagic longline fishery. Observer reports also include disposition of the catch as well as information on hook location, trailing gear, and injury status of protected species interactions. These data are used to estimate post-release mortality of sea turtles and marine mammals based on guidelines for each (Angliss and DeMaster 1998, Ryder *et al*. 2006). See Table 3.38 for sea turtle and marine mammal interactions in the pelagic longline fishery.

Table 3.38 Estimated sea turtle and marine mammal interactions and incidental take levels (ITS) in the US Atlantic pelagic longline fishery (by species, 2005-2015).

Species	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	3 year ITS (2010-12*) Total
Leatherback	368	415	499	385	290	168	240	598	366	270	323	1,764
Loggerhead	283	559	543	771	243	344	438	681	377	261	248	1,905
Other/unidentified sea turtles	0	11	1	0	0	3	4	15	0	6	0	105
Marine mammals	372	313	151	265	144	237	452	413	289	338	na	N/A

*Applies to all subsequent 3-year ITS periods

Bottom longline fishery

NMFS collects data on the disposition (released alive or dead) of bycatch species from logbooks submitted by fishermen in the bottom longline fishery. Observer reports also include disposition of the catch as well as information on hook location, trailing gear, and injury status of protected species interactions. Protected species interactions are summarized in Table 3.39 and Table 3.40.

Table 3.39 Summary of bycatch species in HMS fisheries, Marine Mammal Protection Act category, Endangered Species Act requirements, data collection, and management measures (year implemented) for the bottom longline fishery.

Fishery/Gear Type	Bycatch Species	MMPA Category	ESA Requirements	Bycatch Data Collection	Management Measures
Shark bottom longline	Prohibited shark species Target species after closure Sea turtles Smalltooth sawfish Non-target finfish	Category III	ITS, Terms & Conditions, RPMs	Permit requirement (1993); logbook requirement (1993); observer coverage (1994)	Quotas (1993); trip limit (1994); gear marking (1999); handling & release guidelines (2001); line clippers, dipnets, corrodible hooks, de-hooking devices, move 1 nm after an interaction (2004);

Fishery/Gear Type	Bycatch Species	MMPA Category	ESA Requirements	Bycatch Data Collection	Management Measures
					South Atlantic closure, VMS (2005); shark identification workshops for dealers (2007); sea turtle control device (2008); shark research fishery (2008)

MMPA – Marine Mammal Protection Act; ESA – Endangered Species Act; ITS – Incidental take statement; MRFSS – Marine Recreational Fishing Statistics Survey; EFPs – Exempted fishing permits; BFT – Bluefin tuna; SWO – Swordfish; SHK – Shark; GOM – Gulf of Mexico; NED – North East Distant; MAB – Mid Atlantic Bight; PLL – Pelagic longline; VMS – Vessel monitoring system.

Table 3.40 Protected Species Interactions Observed Bottom Longline Trips Targeting Sharks in the Gulf of Mexico and Atlantic Ocean (2007-2014).

Year	Sea Turtles	Sea Birds	Marine Mammals	Smalltooth Sawfish	Total
2007	4 (2A, 2D)	-	-	3 (2A, 1D)	7
2008	1 (A)	-	-	2 (A)	3
2009	2 (D)	-	-	5 (A)	7
2010	4 (2A, 2D)	-	-	10 (A)	14
2011	4 (1A, 3D)	-	-	2 (A)	6
2012	2 (A)	-	-	1 (D)	3
2013	-	-	-	2 (A)	2
2014	7 (5A, 2D)	-	-	5 (A)	9
Total	24	0	0	30	51

Letters in parentheses indicate whether the animal was released alive (A), dead (D), or unknown (U).

Recreational Handgear Fishery

The LPS collects data on disposition of bycatch (released alive or dead) in recreational HMS fisheries. Rod and reel discard estimates from Virginia to Maine during June through October can be monitored through the expansion of survey data derived from the LPS (dockside and telephone surveys). However, the actual numbers of fish discarded for many species are low. Post-release mortality studies have been conducted on few HMS at this time. Summaries of those studies can be found in HMS SAFE Reports. The number of kept and released fish reported or observed through the LPS dockside intercepts for 2005 – 2014 is presented in Table 3.19 and Table 3.20.

NMFS developed a Code of Angling Ethics as part of implementing Executive Order 12962 – Recreational Fisheries. NMFS implemented a national plan to support, develop, and implement programs that were designed to enhance public awareness and understanding of marine conservation issues relevant to the wellbeing of fishery resources in the context of marine recreational fishing. This code is consistent with National Standard 9, minimizing bycatch and bycatch mortality. These guidelines are discretionary, not mandatory, and are intended to inform

the angling public of NMFS views regarding what constitutes ethical angling behavior. Part of the code covers catch-and-release fishing and is directed towards minimizing bycatch mortality. For a detailed description of the code, please refer to Section 3.9.8.3 of the 2006 Consolidated HMS FMP (NMFS 2006a).

3.10.2 Protected Species Interactions in HMS Fisheries

This section summarizes information on protected species and Atlantic HMS fisheries. The 2011 HMS SAFE Report (NMFS 2011a; NMFS 2015c) provides additional information on species protected under the Marine Mammal Protection Act, Endangered Species Act, and Migratory Bird Treaty Act, including a description of the Pelagic Longline Take Reduction Team (http://www.nmfs.noaa.gov/pr/interactions/trt/pl-trt.htm), Take Reduction Plan, and measures to address protected species concerns. The interaction of seabirds and longline fisheries are also considered under the United States "National Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries" (NPOA – Seabirds). Bycatch of HMS in other fisheries is also discussed in the 2011 HMS SAFE Report.

Protected Species – Reinitiation of ESA Section 7 Consultation in HMS Fisheries

On March 31, 2014, NMFS requested reinitiation of Section 7 consultation under the Endangered Species Act (ESA) on the Atlantic pelagic longline fishery. Despite sea turtle takes that were lower than specified in the ITS, leatherback mortality rates and total mortality levels had exceeded the level specified in the reasonable and prudent alternatives (RPAs) in the 2004 biological opinion. Additionally, new information has become available about leatherback and loggerhead sea turtle populations and sea turtle mortality. While the mortality rate measure will be re-evaluated during consultation, the overall ability of the RPA to avoid jeopardy is not affected, and NMFS is continuing to comply with the terms and conditions of the RPA and RPMs pending completion of consultation. NMFS also has confirmed that there will be no irreversible or irretrievable commitment of resources that would foreclose the formulation or implementation of any reasonable and prudent alternative measures pending completion of consultation, consistent with section 7(d) of the Act.

On July 3, 2014, NMFS issued the final determination to list the Central and Southwest Atlantic Distinct Population Segment (DPS) of scalloped hammerhead shark (*Sphyrna lewini*) as threatened species pursuant to the ESA. On August 27, 2014, NMFS published a final rule to list the following 20 coral species as threatened: five in the Caribbean including Florida and the Gulf of Mexico (*Dendrogyra cylindrus*, *Orbicella annularis*, *O. faveolata*, *O. franksi*, and *Mycetophyllia ferox*); and 15 in the Indo-Pacific (*Acropora globiceps*, *A. jacquelineae*, *A. lokani*, *A. pharaonis*, *A. retusa*, *A. rudis*, *A. speciosa*, *A. tenella*, *Anacropora spinosa*, *Euphyllia paradivisa*, *Isopora crateriformis*, *Montipora australiensis*, *Pavona diffluens*, *Porites napopora*, and *Seriatopora aculeata*). Additionally, in that August 2014 rule, two species that had been previously listed as threatened (*A. cervicornis* and *A. palmata*) in the Caribbean were found to still warrant listing as threatened.

The Central and Southwest Atlantic DPS of scalloped hammerhead sharks and seven Caribbean species of corals have been determined to occur within the management area of Atlantic HMS

fisheries. Therefore, on October 30, 2014, NMFS requested reinitiation of ESA Section 7 consultation on the continued operation and use of several HMS gear types (bandit gear, bottom longline, buoy gear, handline, and rod and reel) and associated fisheries management actions in the 2006 Consolidated Atlantic HMS FMP and its amendments. These management actions were previously consulted on in the 2001 Atlantic HMS biological opinion and the 2012 Shark and Smoothhound biological opinion, to assess potential adverse effects of these gear types on the Central and Southwest DPS of scalloped hammerhead sharks and seven threatened coral species. NMFS has preliminarily determined that the ongoing operation of the fisheries is consistent with existing biological opinions and is not likely to jeopardize the continued existence or result in an irreversible or irretrievable commitment of resources which would foreclose formulation or implementation of any reasonable and prudent alternative measures on the threatened coral species.

With regard to the ongoing reinitiation of ESA Section 7 consultation on the Atlantic PLL fishery, the effects of HMS fishery interactions with the Central and Southwest Atlantic DPS of scalloped hammerhead shark and the seven threatened coral species will be considered in the ongoing PLL consultation. This will most effectively evaluate the effects of the PLL fishery on all listed species in the action area.

Interactions and the MMPA

The MMPA of 1972 as amended is one of the principal Federal statutes guiding marine mammal species protection and conservation policy. In the 1994 amendments, section 118 established the goal that the incidental mortality or serious injury of marine mammals occurring during the course of commercial fishing operations be reduced to insignificant levels approaching a zero mortality rate goal (ZMRG) and serious injury rate within seven years of enactment (*i.e.*, April 30, 2001). In addition, the amendments established a three-part strategy to govern interactions between marine mammals and commercial fishing operations. These include the preparation of marine mammal stock assessment reports, a registration and marine mammal mortality monitoring program for certain commercial fisheries (Category I and II), and the preparation and implementation of take reduction plans (TRP).

NMFS relies on both fishery-dependent and fishery-independent data to produce stock assessments for marine mammals in the Atlantic Ocean, Gulf of Mexico, and the Caribbean Sea. Draft stock assessment reports are typically published in January and final reports are typically published in the fall. Final stock assessment reports can be obtained on the web at: http://www.nmfs.noaa.gov/pr/sars/ while draft 2015 stock assessment reports are available at: http://www.nmfs.noaa.gov/pr/sars/draft.htm.

The following list of species outlines the marine mammal species that occur off the Atlantic and Gulf Coasts that are or could be of concern with respect to potential interactions with HMS fisheries.

Common Name	**Scientific Name**
Atlantic spotted dolphin	*Stenella frontalis*
Blue whale	*Balaenoptera musculus*

Bottlenose dolphin	*Tursiops truncatus*
Common dolphin	*Delphinis delphis*
Fin whale	*Balaenoptera physalus*
Harbor porpoise	*Phocoena phocoena*
Humpback whale	*Megaptera novaeangliae*
Killer whale	*Orcinus orca*
Long-finned pilot whale	*Globicephela melas*
Minke whale	*Balaenoptera acutorostrata*
Northern bottlenose whale	*Hyperoodon ampullatus*
Northern right whale	*Eubalaena glacialis*
Pantropical spotted dolphin	*Stenella attenuata*
Pygmy sperm whale	*Kogia breviceps*
Risso's dolphin	*Grampus griseus*
Sei whale	*Balaenoptera borealis*
Short-beaked spinner dolphin	*Stenella clymene*
Short-finned pilot whale	*Globicephela macrorhynchus*
Sperm whale	*Physeter macrocephalus*
Spinner dolphin	*Stenella longirostris*
Striped dolphin	*Stenella coeruleoalba*
White-sided dolphin	*Lagenorhynchus acutus*

Under MMPA requirements, NMFS produces an annual list of fisheries (LOF) that classifies domestic commercial fisheries, by gear type, relative to their rates of incidental mortality or serious injury of marine mammals. The LOF includes three classifications:

1. Category I fisheries are those with frequent serious injury or incidental mortality to marine mammals;
2. Category II fisheries are those with occasional serious injury or incidental mortality; and
3. Category III fisheries are those with remote likelihood of serious injury or known incidental mortality to marine mammals.

The final 2015 MMPA LOF was published on January 28, 2015 (79 FR 77919); the proposed 2016 MMPA LOF was published on September 29, 2015 (80 FR 58427). The Atlantic Ocean, Caribbean, and Gulf of Mexico large PLL fishery is classified as Category I (frequent serious injuries and mortalities incidental to commercial fishing) and the southeastern Atlantic shark gillnet fishery is classified as Category II (occasional serious injuries and mortalities). The following Atlantic HMS fisheries are classified as Category III (remote likelihood or no known serious injuries or mortalities): Atlantic tuna purse seine; Gulf of Maine and Mid-Atlantic tuna, shark and swordfish, hook-and-line/harpoon; southeastern Mid-Atlantic and Gulf of Mexico shark BLL; and Mid-Atlantic, southeastern Atlantic, and Gulf of Mexico pelagic hook-and-line/harpoon fisheries. Commercial passenger fishing vessel (charter/headboat) fisheries are subject to Section 118 and are listed as a Category III fishery. Recreational vessels are not categorized since they are not considered commercial fishing vessels.

Fishermen participating in Category I or II fisheries are required to register under the MMPA and to accommodate an observer aboard their vessels if requested. Vessel owners or operators,

or fishermen, in Category I, II, or III fisheries must report all incidental mortalities and serious injuries of marine mammals during the course of commercial fishing operations to NMFS. There are currently no regulations requiring recreational fishermen to report takes, nor are they authorized to have incidental takes (*i.e.*, they are illegal).

The PLTRT was formed to address the incidental mortality and serious injury of long-finned pilot whales (*Globicephala melas*) and short-finned pilot whales (*Globicephala macrorhynchus*) in the mid-Atlantic region of the Atlantic PLL fishery. Under section 118 of the MMPA, the PLTRT is charged with developing a TRP to reduce bycatch of pilot whales in the Atlantic PLL fishery to a level approaching a zero mortality rate within 5 years of implementation of the plan. The PLTRT developed a final TRP (May 19, 2009, 74 FR 23349) effective June 18, 2009. The TRP implemented a suite of management strategies to reduce mortality and serious injury of pilot whales and Risso's dolphins in the Atlantic PLL fishery. NMFS finalized the following three regulatory measures: (1) establish a Cape Hatteras Special Research Area (CHSRA), with specific observer and research participation requirements for fishermen operating in that area; (2) set a 20–nm (37.02–km) upper limit on mainline length for all PLL sets within the MAB; and (3) require an informational placard on handling and release of marine mammals be displayed both in the wheelhouse and on the working deck of all active PLL vessels in the Atlantic fishery. NMFS also finalized the following non-regulatory measures: (1) increased observer coverage in the MAB to 12-15 percent to ensure representative sampling of pilot whales and Risso's dolphins; (2) encourage vessel operators to maintain daily communication with other local vessel operators regarding protected species interactions throughout the PLL fishery with the goal of identifying and exchanging information relevant to avoiding protected species bycatch; (3) recommending that NMFS update the guidelines for handling and releasing marine mammals and NMFS and the industry to develop new technologies, equipment, and methods for safer and more effective handling and release of marine mammals; and (4) recommending NMFS pursue research and data collection goals in the PLTRT regarding pilot whales and Risso's dolphins. More information on the PLTRT can be found at http://www.nmfs.noaa.gov/pr/interactions/trt/pl-trt.html. The PLTRT last met in December 2015 in Virginia Beach, VA, to discuss progress under the Plan.

Interactions and the ESA

The ESA of 1973, as amended (16 U.S.C. 1531 et seq.), provides for the conservation and recovery of endangered and threatened species of fish, wildlife, and plants. The listing of a species is based on the status of the species throughout its range or in a specific portion of its range in some instances. Threatened species are those likely to become endangered in the foreseeable future [16 U.S.C. §1532(20)] if no action is taken to stop the decline of the species. Endangered species are those in danger of becoming extinct throughout all or a significant portion of their range [16 U.S.C. §1532(20)]. Species can be listed as endangered without first being listed as threatened. The Secretary of Commerce, acting through NMFS, is authorized to list marine and anadromous fish species, marine mammals (except for walrus and sea otter), marine reptiles (such as sea turtles), and marine plants. The Secretary of the Interior, acting through the USFWS, is authorized to list walrus and sea otter, seabirds, terrestrial plants and wildlife, and freshwater fish and plant species.

In addition to listing species under the ESA, the service agency (NMFS or USFWS) generally must designate critical habitat for listed species concurrently with the listing decision to the "maximum extent prudent and determinable" [16 U.S.C. §1533(a)(3)]. The ESA defines critical habitat as those specific areas that are occupied by the species at the time it is listed that are essential to the conservation of a listed species and that may be in need of special consideration, as well as those specific areas that are not occupied by the species that are essential to their conservation. Federal agencies are prohibited from undertaking actions that are likely to destroy or adversely modify designated critical habitat.

Marine Mammals	**Status**
Blue whale *(Balaenoptera musculus)*	Endangered
Fin whale *(Balaenoptera physalus)*	Endangered
Humpback whale *(Megaptera novaeangliae)*	Endangered
Northern right whale *(Eubalaena glacialis)*	Endangered
Sei whale *(Balaenoptera borealis)*	Endangered
Sperm whale *(Physeter macrocephalus)*	Endangered
Sea Turtles	
Green turtle *(Chelonia mydas)*	*Endangered/Threatened
Hawksbill sea turtle *(Eretmochelys imbricata)*	Endangered
Kemp's ridley sea turtle *(Lepidochelys kempii)*	Endangered
Leatherback sea turtle *(Dermochelys coriacea)*	Endangered
Loggerhead sea turtle *(Caretta caretta)*	Threatened
Olive ridley sea turtle *(Lepidochelys olivacea)*	Threatened
Critical Habitat	
Northern right whale	Endangered
Finfish	
Smalltooth sawfish *(Pristis pectinata)*	Endangered
Atlantic Sturgeon (Acipenser oxyrinchus oxyrinchus)	**Endangered/Threatened

*Green sea turtles in U.S. waters are listed as threatened except for the Florida breeding population, which is listed as endangered. Due to the inability to distinguish between the populations away from the nesting beaches, green sea turtles are considered endangered wherever they occur in U.S. waters.
** Atlantic sturgeon have five distinct population segments. The population in the Gulf of Mexico is considered threatened. The other populations in the New York bight, Chesapeake Bay, Carolina, and South Atlantic are all considered endangered.

Sea Turtles

NMFS has taken several significant steps to reduce sea turtle bycatch and bycatch mortality in domestic longline fisheries. On March 30, 2001, NMFS implemented via interim final rule requirements for U.S. flagged vessels with PLL gear on board to have line clippers and dipnets to remove gear on incidentally captured sea turtles (66 FR 17370). Specific handling and release guidelines designed to minimize injury to sea turtles were also implemented. NMFS published a final report which provides the detailed guidelines and protocols (NMFS, 2008c) and a copy can be found at http://www.sefsc.noaa.gov/turtles/TM_NMFS_SEFSC_580.pdf.

A BiOp completed on June 14, 2001, found that the actions of the PLL fishery jeopardized the continued existence of loggerhead and leatherback sea turtles. This document reported that the PLL fishery interacted with an estimated 991 loggerhead and 1,012 leatherback sea turtles in 1999. The estimated take levels for 2000 were 1,256 loggerhead and 769 leatherback sea turtles (Yeung, 2001).

On July 13, 2001 (66 FR 36711), NMFS published an emergency rule that closed the NED area to PLL fishing (effective July 15, 2001), modified how PLL gear may be deployed effective August 1, 2001, and required that all longline vessels (pelagic and bottom) post safe handling guidelines for sea turtles in the wheelhouse. On December 13, 2001 (66 FR 64378), NMFS extended the emergency rule for 180 days through July 8, 2002. On July 9, 2002, NMFS published a final rule (67 FR 45393) that closed the NED to PLL fishing. As part of the Reasonable and Prudent Alternative, the BiOp required NMFS to conduct an experiment with commercial fishing vessels to test fishery-specific gear modifications to reduce sea turtle bycatch and mortality. This rule also required the length of any gangions to be 10 percent longer than the length of any floatline on vessels where the length of both is less than 100 meters; prohibited stainless steel hooks; and required gillnet vessel operators and observers to report any whale sightings and required gillnets to be checked every 0.5 to 2 hours.

The experimental program required in the BiOp was initiated in the NED area in 2001 in cooperation with the U.S. PLL fleet that historically fished on the Grand Banks fishing grounds. The goal of the experiment was to test and develop gear modifications that might prove useful in reducing the incidental catch and post-release mortality of sea turtles captured by PLL gear while striving to minimize the loss of target catch. The experimental fishery had a three-year duration and utilized 100 percent observer coverage to assess the effectiveness of the measures. The gear modifications tested in 2001 included blue-dyed squid and moving gangions away from floatlines. In 2002, the NED experimental fishery examined the effectiveness of whole mackerel bait, squid bait, circle and "J" hooks, and reduced daylight soak time in reducing the capture of sea turtles. The experiment tested various hook and bait type combinations in 2003 to verify the results of the 2002 experiment.

On November 28, 2003, based on the conclusion of the three-year NED experiment, and preliminary data that indicated that the Atlantic PLL fishery may have exceeded the Incidental Take Statement in the June 14, 2001 BiOp, NMFS published a Notice of Intent to prepare an SEIS to assess the potential effects on the human environment of proposed alternatives and actions under a proposed rule to reduce sea turtle bycatch (68 FR 66783). A new BiOp for the Atlantic PLL fishery was completed on June 1, 2004 (NMFS, 2004b). The BiOp concluded that long-term continued operation of the Atlantic PLL fishery, authorized under the 1999 FMP, was not likely to jeopardize the continued existence of loggerhead, green, hawksbill, Kemp's ridley, or olive ridley sea turtles; and was likely to jeopardize the continued existence of leatherback sea turtles.

On July 6, 2004, NMFS implemented additional regulations for the Atlantic PLL fishery to further reduce the mortality of incidentally caught sea turtles (69 FR 40734). These measures include requirements on hook type, hook size, bait type, dipnets, line clippers, and safe handling

guidelines for the release of incidentally caught sea turtles. These requirements were developed based on the results of the 2001 – 2003 NED experiment (Watson *et al*., 2003; Watson *et al*., 2004; Shah *et al*., 2004). These requirements are predicted to decrease the number of total interactions, as well as the number of mortalities, of both leatherback and loggerhead sea turtles (NMFS, 2004c). Post-release mortality rates are expected to decline due to a decrease in the number of turtles that swallow hooks which engage in the gut or throat, a decrease in the number of turtles that are foul-hooked and improved handling and gear removal protocols. NMFS is working to export this new technology to PLL fleets of other nations to reduce global sea turtle bycatch and bycatch mortality. U.S gear experts have presented this bycatch reduction technology and data from research activities at approximately 15 international events that included fishing communities and resource managers between 2002 and mid-2005 (NMFS, 2005a).

On February 7, 2007, NMFS published a rule that required BLL vessels to carry the same dehooking equipment as the PLL vessels. To date, all bottom and PLL vessels with commercial shark permits are required to have NMFS-approved sea turtle dehooking equipment onboard (PLL: July 6, 2004, 69 FR 40734; BLL: February 7, 2007, 72 FR 5639).

A May 20, 2008 BiOp issued under Section 7 of the ESA for Amendment 2 concluded, based on the best available scientific information, that Amendment 2 was not likely to jeopardize the continued existence of endangered green, leatherback, and Kemp's ridley sea turtles; the endangered smalltooth sawfish; or the threatened loggerhead sea turtle.

On March 31, 2014, the Office of Sustainable Fisheries (OSF) requested reinitiation of consultation on the PLL BiOp due to new information on mortality rates and total mortality estimates for leatherback turtles that exceed those specified in the reasonable and prudent alternative (RPA); changes in information about leatherback and loggerhead populations; and new information on sea turtle mortality. On October 30, 2014, NMFS requested reinitiation of ESA Section 7 consultation on the continued operation and use of several HMS gear types (bandit gear, bottom longline, buoy gear, handline, and rod and reel) and associated fisheries management actions in the 2006 Consolidated Atlantic HMS FMP and its amendments, after Central and Southwest Atlantic DPS of scalloped hammerhead sharks and seven Caribbean species of corals were determined to occur within the management area of Atlantic HMS fisheries. See above in this section for more information on reinitiation of ESA Section 7 consultation in HMS fisheries.

Internationally, the United States is pursuing sea turtle conservation through international, regional, and bilateral organizations such as ICCAT, the Asia Pacific Fishery Commission, and FAO Committee on Fisheries (COFI). The United States intends to provide a summary report to FAO for distribution to its members on bycatch of sea turtles in U.S. longline fisheries and the research findings as well as recommendations to address the issue. At the 24th session of COFI held in 2001, the United States distributed a concept paper for an international technical experts meeting to evaluate existing information on turtle bycatch, to facilitate and standardize collection of data, to exchange information on research, and to identify and consider solutions to reduce turtle bycatch. COFI agreed that an international technical meeting could be useful despite the lack of agreement on the specific scope of that meeting. The United States has developed a

prospectus for a technical workshop to address sea turtle bycatch in longline fisheries as a first step. Other gear-specific international workshops may be considered in the future. More information on sea turtle bycatch mitigation can be found in Section 4.1.1 of the 2015 SAFE Report (NMFS 2015c).

Interactions with Seabirds

The NPOA-Seabirds (http://www.nmfs.noaa.gov/ia/species/seabirds/us_npoa.pdf) was released in February 2001, and calls for detailed assessments of longline fisheries, and, if a problem is found to exist within a longline fishery, for measures to reduce seabird bycatch within two years. Because interactions appear to be relatively low in Atlantic HMS fisheries, the adoption of immediate measures is unlikely. The 2014 Report on the Implementation of the United States National Plan of Action for Reducing the Incidental Catch of Seabirds in Longline Fisheries was submitted to the UN FAO in June 2014 and can be found here http://www.nmfs.noaa.gov/ia/resources/publications/ccrf/longline_fisheries.pdf.

Gannets, gulls, greater shearwaters, and storm petrels are occasionally hooked by Atlantic PLL gear. These species and all other seabirds are protected under the Migratory Bird Treaty Act. The majority of longline interactions with seabirds occur as the gear is being set. The birds eat the bait and become hooked on the line. The line then sinks and the birds are subsequently drowned.

3.10.3 Additional Measures to Address Protected Species Concerns

NMFS has taken a number of actions designed to reduce interactions with protected species over the last few years. Bycatch reduction measures have been implemented through the 1999 FMP (NMFS, 1999), in Regulatory Amendment 1 to the 1999 FMP (NMFS, 2000), in Regulatory Adjustment 2 to the 1999 FMP (NMFS, 2002), in Amendment 1 to the 1999 FMP (NMFS, 2003), and in the June 2004 Final Rule for Reduction of Sea Turtle Bycatch and Bycatch Mortality in the Atlantic PLL Fishery (69 FR 40734). NMFS closed the Southeast U.S. Restricted Area to gillnet fisheries from February 15, 2006, to March 31, 2006, as a result of an entanglement and subsequent mortality of a right whale with gillnet gear (71 FR 8223). NMFS continues to monitor observed interactions with marine mammals and sea turtles on a quarterly basis and reviews data for appropriate action, if any, as necessary. A final rule requiring the possession and use of an additional sea turtle control device as an addition to the existing requirements for sea turtle bycatch mitigation gear in pelagic and BLL fisheries was effective October 23, 2008 (73 FR 54721). For a summary of bycatch management measures, please refer to Section 7.2 of the 2015 SAFE Report (NMFS 2015c).

3.10.4 Evaluation of Other Bycatch Reduction Measures

NMFS continues to monitor and evaluate bycatch in HMS fisheries through direct enumeration (pelagic and BLL observer programs, shark gillnet observer program), evaluation of management measures (e.g., closed areas, trip limits, gear modifications), and VMS.

The following section provides a review of additional management measures or issues that address bycatch reduction:

Atlantic Large Whale Take Reduction Plan (ALWTRP) regulations

Major changes to the ALWTRP were implemented in a final rule that published on October 5, 2007 (72 FR 57104). Regulations that affect HMS fisheries, specifically gillnet fisheries, include: 1) a closed area for all gillnet fisheries from November 15 – April 15 from 29° 00' N to 32° 00' N from shore eastward to 80° 00'W and off SC, within 35 nautical miles of the coast (Southeast US Restricted Area North); 2) a restricted area from December 1 – March 31 from 27° 51'N to 29° 00'N from shore eastward to 80° 00'W (Southeast US Restricted Area South); 3) additional seasonal boundaries for EEZ waters east of 80° 00'W from 26° 46.50'N to 32° 00'N (Other Southeast Gillnet Waters); and 4) a monitoring area specific to the Atlantic shark gillnet fishery that extends from the area along the coast from 27° 51'N south to 26° 46.50'N eastward to 80° 00'W (Southeast US Monitoring Area) effective December 1 – March 31. Specific compliance requirements for fishing in these areas vary and are summarized in the Guide to the Atlantic Large Whale Take Reduction Plan. For additional information please see the ALWTRP website http://www.greateratlantic.fisheries.noaa.gov/Protected/whaletrp/.

Atlantic Bottlenose Dolphin Take Reduction Team

NMFS published a final rule on April 22, 2006, to implement the TRP. Included in the final rule are: 1) effort reduction measures; 2) gear proximity requirements; 3) gear or gear deployment modifications; and 4) outreach and education measures to reduce dolphin bycatch below the stock's potential biological removal level. The final rule also includes time/area closures and size restrictions on large mesh fisheries to reduce incidental takes of endangered and threatened sea turtles as well as to reduce dolphin bycatch.

Vessel Monitoring Systems in HMS Fisheries

NMFS implemented fleet-wide VMS requirements in the Atlantic PLL fishery in September 2003. Starting in 2004, gillnet vessels with a directed shark permit and gillnet gear onboard were required to install and operate a VMS unit from November 15 – March 31 of each year. In an attempt to better quantify bycatch, NMFS required all vessels with shark LAPs to participate in the Directed Shark Gillnet Observer program. Directed shark BLL vessels located between 33° N and 36° 30' N need to install and operate a VMS unit from January through July each year. Starting in 2015, purse seine vessel owners are required to use VMS and must submit through a set report within 12 hours of completion of each purse seine set.

On December 2, 2011, NMFS published a final rule requiring all HMS vessels currently required to replace their Mobile Transmitting Unit VMS with Enhanced Mobile Transmitting Unit VMS units. These installations have to be performed by a qualified marine electrician. These units are capable of two way communication, therefore, vessel operators would also have to provide information on target species and fishing gear onboard by sending a hail out message using their VMS at least two-hours prior to leaving port. Vessels would then be required to send a hail-in message indicating when and where they would be returning to port with their VMS two hours

before returning. Because of unforeseen circumstances, these updated requirements were delayed for just over a year and vessels could continue to adhere to the previous VMS requirements. The new requirements went into effect on January 1, 2013 (77 FR 61727, October 11, 2012), and vessels must now have the E-MTU units.

Amendment 7 to the 2006 Consolidated HMS FMP requires vessels fishing with PLL gear to report through VMS the following information within 12 hours of completion of each PLL set: date the set was made; area in which the set was made; the number of hooks in the set; and the approximate length of all bluefin tuna retained, discarded dead, or released alive (by standardized size ranges). If a vessel is fishing both inside and outside of the Northeast Distant Area (NED) on the same trip, that vessel must submit two VMS bluefin catch reports noting the location of the catch. Permit holders must also submit a landing notification at least 3 hours, but no more than 12 hours, prior to any landing. Purse seine vessel owners are required to use VMS and must submit through a set report within 12 hours of completion of each purse seine set. Specifically, the report must include: date the set was made; area in which the set was made; and the approximate length of all bluefin tuna retained, discarded dead, or released alive (by standardized size ranges), including reporting of zero bluefin on a set. These requirements went into effect January 1, 2015.

Amendment 9 to the 2006 Consolidated HMS FMP requires federal directed shark permit holders with gillnet gear on board to use VMS only in the Southeast U.S. Monitoring Area, pursuant to Atlantic Large Whale Take Reduction Plan requirements. The Amendment 9 measures will be effective on March 15, 2016.

3.11 Effectiveness of Existing Time/Area Closures in Reducing Bycatch

Since 2000, NMFS has implemented a number of time/area closures and gear restrictions in the Atlantic Ocean and Gulf of Mexico for the PLL fishery to reduce discards and bycatch of a number of species (e.g., juvenile swordfish, bluefin tuna, billfish, sharks, sea turtles). Circle hooks are required for the entire PLL fishery since July 2004. In May 2011, NMFS implemented a requirement that only "weak" circle hooks be used in the Gulf of Mexico PLL fishery in order to reduce the bycatch of bluefin tuna. Weak hooks are made with thinner wire (no larger than 3.65 mm in diameter) than standard hooks, which allows them to bend more easily and release large bluefin tuna quickly, thus allowing them to escape. Preliminary analyses of the effectiveness of the closures and combined closures and circle hook requirement are summarized here. Preliminary analysis of the effectiveness of weak hooks is being conducted. A brief summary of the prohibition of live bait in the Gulf of Mexico PLL fishery is available in the 2011 HMS SAFE Report (NMFS 2011a; NMFS 2015c). Amendment 7, effective January 1, 2015, implemented gear restricted areas for the PLL fishery in the Gulf of Mexico and Atlantic in order to reduce interactions between PLL gear and bluefin tuna. The Amendment 7 Gulf of Mexico GRAs prohibit the use of PLL gear during April and May, and the Amendment 7 Cape Hatteras GRA provides conditional access to the area for vessels fishing with PLL during December through April. Data from the PLL fishery from 2015 will be available during 2016, which may contribute toward evaluation of the efficacy of the GRAs.

The combined effects of the individual area closures and gear restrictions were examined by comparing the reported catch and discards from 2005-2015 to the averages for 1997-1999 throughout the entire U.S. Atlantic fishery. Previous analyses attempted to examine the effectiveness of the time/area closures only by comparing the 2001-2003 reported catch and discards to the base period (1997-1999) chosen and are included here as well for reference. Overall effort, expressed as the number of hooks reported per set, declined by 24.1 percent during 2005-2015 from 1997-1999 (Table 3.41). Declines in the number of hooks set were noted for almost all areas with the exception of the Sargasso (SAR) area, where reported effort has increased more than ten-fold from the 1997-1999 period. However, this effort represents only 4.7 percent of the overall effort reported in this fishery. Effort also increased in the Florida East Coast (FEC) area by 17 percent and in the South Atlantic Bight (SAB) by 8.9. Reported effort declined by 40 percent or more in all other areas with the exception of the Gulf of Mexico. As a result of the Deepwater Horizon/BP oil spill in the Gulf of Mexico and the subsequent closures, reported effort for 2010 was dramatically reduced, less than one third of the reported effort of the previous year (2009). Reported effort in 2012 increased from 2011, but has declined since. Reported effort declined by 62.7 percent in the SAT area (Tuna North and Tuna South combined), but this represents less than three percent of total reported effort. Reported effort in the Caribbean area (CAR) declined by over 80 percent in 2005-2015 from 1997-99, but this area accounts for less than one percent of the total effort.

The percent changes in the reported numbers of fish caught and discarded were compared to the predicted changes from the analyses in Regulatory Amendment 1 to the 1999 FMP (NMFS 2000). Declines were noted in both the numbers of kept and discards of almost all species examined including swordfish, tunas, sharks, billfish, and sea turtles. The only positive changes from the base period were the numbers of bluefin tuna and dolphin kept and bluefin tuna, large coastal sharks, and spearfish discards (Table 3.42 and Table 3.43). The reported number of bluefin tuna kept increased by 54.7 percent for 2005-2015 compared to 1997-1999 (Table 3.42). The number of reported discards of bluefin tuna decreased by 3.3 percent between the same time periods, which is less than the predicted 10.7 percent increase from the analyses in Regulatory Amendment 1. The number of dolphin kept increasing by 9.8 percent between time periods (Table 3.43). Billfish (blue and white marlin, sailfish) discards decreased by 42-64 percent from 1997-1999 to 2005-2015 (Table 3.43). The reported discards of spearfish increased by 37.5 percent. The reported number of turtle interactions decreased by 70 percent from 1997-1999 to 2005-2015 (Table 3.43). The reported declines in swordfish kept and discarded, large coastal sharks kept, and BAYS tunas kept decreased more than the predicted values developed for Regulatory Amendment 1. Reported discards of pelagic sharks, all billfish (with the exception of spearfish for which no predicted change was developed in Regulatory Amendment 1), and turtle interactions also declined more than the predicted values. The number of LCS discards increased slightly from 1997-1999 to 2005-2015 (Table 3.43).

Concern over the status of bluefin tuna and the effects of the PLL fishery on bluefin tuna led to a re-examination of a previous analysis which compared the reported catch and discards of select species or species groups from the MAB and NEC to that reported from the rest of the fishing areas (Table 3.44 and Table 3.45). The number of bluefin tuna discards reported from the MAB/NEC had been increasing from 2006-2010 but decreased beginning in 2011 and has stayed low since. The number of bluefin tuna kept decreased to 55 in 2013 and was up to 104 in 2014.

The discards from the other areas have remained relatively constant, fluctuating between 100 and 300 for the past 10 years. The level of bluefin tuna discards in the MAB/NEC does not appear to be effort-related as the reported number of hooks set has been relatively stable (MAB) or in decline (NEC).

Table 3.41 Reported distribution of hooks set by area, 1997-2015, and percent change since 1997-99.

Year	CAR	GOM	FEC	SAB	MAB	NEC	NED	SAR	NCA	SAT	Total
1997-99	328,110	3,346,298	722,580	813,111	1,267,409	901,593	511,431	14,312	191,478	436,826	8,533,148
(A) 2001-03	175,195	3,682,536	488,838	569,965	944,929	624,497	452,430	76,130	222,070	127,497	7,364,086
2004	298,129	4,118,468	264,524	672,973	856,521	462,171	455,862	128,582	20,990	47,730	7,325,950
2005	180,885	3,037,968	323,551	467,680	835,091	356,696	462,490	110,107	55,716	92,382	5,922,566
2006	73,774	2,577,231	281,239	544,647	1,085,640	406,199	339,586	135,575	64,500	153,620	5,662,011
2007	32,650	2,914,475	345,486	737,873	1,319,056	326,532	285,827	100,336	11,409	207,598	6,281,242
2008	87,190	2,368,381	642,846	846,984	1,423,136	579,244	224,635	147,969	16,148	152,763	6,489,246
2009	34,783	3,037,197	830,348	847,525	1,199,657	481,110	262,003	107,172	0	179,152	6,978,947
2010	77,710	1,005,764	1,097,929	1,002,748	1,295,242	657,892	211,465	141,713	3,096	235,553	5,729,112
2011	29,600	1,247,892	1,129,555	984,858	1,330,542	665,706	173,038	206,923	11,270	135,069	5,914,453
2012	7,200	2,655,468	1,285,060	937,946	1,513,367	787,681	127,044	171,177	3,300	190,211	7,678,454
2013	38.090	2,304,802	1,239,326	1,185,433	1,450,434	516,159	152,896	242,920	11,758	164,079	7,305,897
2014	21,390	2,219,684	1,171,402	1,133,640	1,232,857	507,525	343.220	367,598	10,530	117,377	7,125,223
2015	30,435	1,465,502	926,512	1,046,018	1,207,746	519,349	225,011	277,506	13,250	144,648	5,855,977
(B) 2005-15	55,792	2,266,227	854,100	858,196	1,263,545	527,697	273,035	182,963	17,825	162,280	6,479,660
% diff (A)	-46.6	10.0	-32.3	-29.9	-25.4	-30.7	-11.5	431.9	16.0	-70.8	-13.7
% diff (B)	-83.0	-32.3	17.0	8.9	-0.3	-41.5	-46.6	1,178.4	-90.7	-62.9	-24.1

(A) and (B) are average values for the years indicated. CAR – Caribbean; GOM - Gulf of Mexico; FEC - Florida East Coast; SAB - South Atlantic Bight; MAB - Mid-Atlantic Bight; NEC - Northeast Coastal; NED - Northeast Distant; SAR - Sargasso; NCA - North Central Atlantic; SAT - Tuna North & Tuna South. Source: HMS Logbook.

Table 3.42 Number of swordfish, bluefin tuna, yellowfin tuna, bigeye tuna, total BAYS (bigeye, albacore, yellowfin and skipjack tuna), reported landed or discarded in the U.S. Atlantic PLL fishery, 1997 – 2015, and percent change from 1997-99.

Year	Number of Hooks Set (x1000)	Swordfish Kept	Swordfish Discards	Bluefin Tuna Kept	Bluefin Tuna Discards	Yellowfin Tuna Kept	Yellowfin Tuna Discards	Bigeye Tuna Kept	Bigeye Tuna Discards	Total BAYS Kept	Total BAYS Discards
1997-99	8,533.1	69,131	21,519	238	877	72,342	2,489	21,308	1,133	101,477	4,224
(A) 2001-03	7,364.1	50,838	13,240	212	607	55,166	1,827	13,524	395	76,116	3,069
2004	7,325.9	46,950	10,704	476	1,031	64,128	1,736	8,266	486	77,989	3,452
2005	5,922.6	41,239	11,158	376	766	43,833	1,316	8,383	369	57,237	2,545
2006	5,662.0	38,241	8,900	261	833	55,821	1,426	12,491	257	73,058	2,865
2007	6,290.6	45,933	11,823	357	1,345	56,062	1,452	8,913	249	70,390	3,031
2008	6,498.1	48,000	11,194	343	1,417	33,774	1,717	11,254	356	50,108	3,427
2009	6,978.9	45,378	7,484	629	1,290	40,912	1,701	10,379	397	57,461	3,555
2010	5,729.1	33,813	6,107	392	1,488	32,567	748	12,561	476	51,786	1,590
2011	5,914.5	38,012	8,510	355	764	40,993	728	16,338	453	68,401	2,850
2012	7,678.5	51,544	7,996	392	563	59,188	1,046	14,841	459	84,707	3,113
2013	7,305.9	44,556	4,765	273	266	39,988	941	15,472	513	67,073	2,376
2014	7,125.2	32,908	4,655	379	380	41,799	647	17,020	459	73,339	1,973
2015	5,855.9	27,730	5,382	320	210	28,346	1,412	16,236	519	54,734	3,117
(B) 2005-15	6,479.7	40,509	8,030	368	848	43,123	1,194	13,090	410	64,513	2,771
% dif (A)	-13.7	-26.5	-38.5	-10.9	-30.8	-23.7	-26.6	-36.5	-65.1	-25.0	-27.3
% dif (B)	-24.1	-41.4	-62.7	54.7	-3.3	-40.4	-52.0	-38.6	-63.8	-36.4	-34.4
Pred [1]		-24.6	-41.5		-1.0					-5.2	
Pred [2]		-13.0	-31.4		10.7					10.0	

(A) and (B) are average values for the years indicated. Predicted values from Regulatory Amendment 1, where Pred [1] = without redistribution of effort, Pred [2] = with redistribution of effort. Source: HMS Logbook.

Table 3.43 Number of pelagic sharks, large coastal sharks, dolphinfish, and wahoo reported landed or discarded and number of billfish (blue and white marlin, sailfish, spearfish) and sea turtles reported caught and discarded in the U.S. Atlantic PLL fishery, 1997 – 2015, and percent changes since 1997-99.

Year	Pelagic Sharks Kept	Pelagic Shark Discards	Large Coastal Sharks Kept	Large Coastal Shark Discards	Dolphinfish Kept	Dolphinfish Discards	Wahoo Kept	Wahoo Discards	Blue Marlin Discards	White Marlin Discards	Sailfish Discards	Spearfish Discards	Sea Turtles
1997-99	3,898	52,093	8,860	6,308	39,711	608	5,172	175	1,621	1,973	1,342	213	596
(A) 2001-03	3,237	23,017	5,306	4,581	29,361	322	3,776	74	815	1,045	341	139	429
2004	3,460	25,414	2,304	5,144	39,561	295	4,674	35	713	1,060	425	172	370
2005	3,150	21,560	3,365	5,881	25,709	556	3,360	280	569	990	367	155	154
2006	2,098	24,113	1,768	5,326	25,658	1,041	3,608	100	439	557	277	142	128
2007	3,504	27,478	546	7,133	68,124	467	3,073	52	611	744	321	147	300
2008	3,500	28,786	115	6,732	43,511	404	2,571	82	686	669	505	196	476
2009	3,060	33,721	403	6,672	62,701	433	2,648	81	1,013	1,064	774	335	137
2010	3,872	45,511	434	6,726	30,454	174	749	26	504	605	312	212	94
2011	3,694	43,778	130	6,085	29,442	335	1,848	50	539	921	556	281	66
2012	2,794	23,038	86	7,716	42,445	432	3,121	92	843	1,432	767	270	61
2013	3,394	28,800	50	8,629	34,250	181	2,721	59	844	1,239	456	342	92
2014	3,851	38,496	47	5,880	63,217	205	3,235	74	718	1,580	445	306	93
2015	2,208	45,082	50	8,839	53,526	1,413	1,563	163	990	2,855	715	837	357
(B) 2005-15	3,230	35,320	636	6,899	43,616	514	2,597	97	710	1,153	504	293	179
% diff (A)	-17.0	-55.8	-40.1	-27.4	-26.1	-47.0	-27.0	-57.7	-49.7	-47.0	-74.6	-34.7	-28.0
% diff (B)	-17.1	-32.2	-92.8	9.4	9.8	-15.4	-49.8	-44.6	-56.2	-41.6	-62.4	37.5	-70.0
Pred [1]	-9.5	-2.0	-32.1	-42.5	-29.3				-12.0	-6.4	-29.6		-1.9
Pred [2]	4.1	8.4	-18.5	-33.3	-17.8				6.5	10.8	-14.0		7.1

(A) and (B) are average values for the years indicated. Predicted values from Regulatory Amendment 1 where Pred [1] = without redistribution of effort, Pred [2] = with redistribution of effort. Source: HMS Logbook.

Table 3.44 Number of Bluefin Tuna, Swordfish, Pelagic and Large Coastal Sharks, Billfish, and Sea Turtles Reported Kept and/or Discarded in the Mid-Atlantic Bight and Northeast Coastal Areas Combined (1997-2015).

Year	Hooks Set (x1000)	BFT Kept	BFT Discards	SWO Kept	SWO Discards	PEL Shark Kept	PEL Shark Discards	LCS Kept	LCS Discards	Billfish Discards	Sea Turtle Interactions
1997	2,441.1	96	583	6,330	3,663	3,062	40,515	6,670	958	803	52
1998	2,207.4	94	1,157	9,684	4,923	2,143	28,579	1,781	890	401	57
1999	1,858.5	70	335	8,213	4,331	1,680	12,479	1,966	736	818	174
2000	1,645.4	26	356	8,748	2,846	2,099	13,083	4,744	1,407	240	30
2001	1,975.3	45	200	10,661	4,000	2,537	9,013	4,383	997	310	69
2002	1,582.3	18	389	10,986	4,219	2,378	7,308	2,331	1,207	311	41
2003	1,150.7	67	471	10,888	3,022	2,222	6,929	2,787	1,429	172	42
2004	1,318.7	128	709	8,486	2,463	2,323	7,594	923	1,488	219	54
2005	1,191.8	96	575	9,184	2,420	1,912	7,026	2,512	2,433	473	44
2006	1,491.8	124	737	10,278	2,564	1,428	7,547	1,279	2,180	266	28
2007	1,645.6	137	1,148	14,102	3,082	2,313	8,169	431	2,861	407	55
2008	2,002.5	143	1,133	13,208	3,199	2,695	9,541	63	1,781	320	100
2009	1,608.8	137	952	12,657	1,896	2,256	14,113	206	2,210	299	16
2010	1,953.1	155	1,301	9,090	1,546	3,326	17,033	408	2,293	376	32
2011	1,996.3	168	583	9,995	2,474	2,793	19,867	90	1,809	497	28
2012	2,301.1	102	270	12,597	1,396	2,199	13,535	9	1,972	650	16
2013	1,966.6	55	107	9,806	2,766	2,711	17,958	9	1,366	693	31
2014	1,740.4	104	122	5,027	1,015	3,115	16,405	6	1,050	710	18
2015	1,727.1	74	146	6,637	2,235	1,795	17,625	8	3,668	1,888	256

BFT - Bluefin tuna; SWO – Swordfish; PEL – Pelagic sharks; LCS - Large coastal sharks; MAB - Mid-Atlantic Bight; NEC - Northeast Coastal. Source: HMS Logbook.

Table 3.45 Number of Bluefin Tuna, Swordfish, Pelagic and Large Coastal Sharks, Billfish, and Sea Turtles Reported Kept and/or Discarded in All Areas Other than the Mid-Atlantic Bight and Northeast Coastal (1997-2015).

Year	Hooks Set (x1000)	BFT Kept	BFT Discards	SWO Kept	SWO Discards	PEL Shark Kept	PEL Shark Discards	LCS Kept	LCS Discards	Billfish Discards	Turtle Interactions
1997	7,233.5	111	123	62,892	16,892	2,048	41,507	7,076	6,911	6,091	215
1998	5,823.9	143	164	60,943	18,422	1,588	16,682	4,677	4,687	3,364	833
1999	6,035.1	200	269	59,331	16,325	1,172	16,516	4,409	4,741	3,968	458
2000	6,376.5	210	382	54,787	13,860	969	14,965	3,014	5,320	3,394	241
2001	5,767.0	138	148	38,575	10,448	974	14,941	2,127	3,895	1,723	352
2002	5,647.3	160	204	39,453	8,963	693	15,160	1,746	2,761	2,866	426
2003	5,969.7	208	410	41,950	9,067	907	14,842	2,565	3,453	1,641	357
2004	6,007.3	348	322	38,464	8,241	1,137	17,820	1,381	3,656	2,151	316
2005	4,730.8	280	191	32,055	8,738	1,238	14,534	853	3,448	1,608	110
2006	4,170.2	137	96	27,963	6,336	670	16,566	489	3,146	1,149	100
2007	4,645.1	200	197	31,831	8,741	1,191	19,309	115	4,272	1,416	245
2008	4,495.7	200	284	29,592	7,995	805	19,245	52	4,951	1,736	376
2009	5,298.2	492	338	32,721	5,588	804	16,608	197	4,462	2,887	121
2010	3,775.9	237	187	24,723	4,561	546	28,478	26	4,433	1,257	62
2011	3,918.2	187	181	28,017	6,036	901	23,911	40	4,276	1,800	38
2012	5,377.4	290	293	38,947	6,600	595	9,503	77	5,744	2,743	45
2013	5,339.3	218	159	34,750	2,583	683	9,842	41	7,263	2,190	61
2014	5,384.8	275	258	27,881	3,640	689	22,101	41	4,855	2,339	77
2015	4,128.9	246	64	21,093	3,147	413	27,457	42	5,171	3,509	101

BFT - Bluefin tuna; SWO – Swordfish; PEL – Pelagic sharks; LCS - Large coastal sharks; MAB - Mid-Atlantic Bight; NEC - Northeast Coastal. Source: Fisheries Logbook System.

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4.0 Environmental Consequences of Alternatives

The 2016 SEDAR 21 stock assessment update indicated that the dusky shark stock is overfished and that overfishing is occurring on the stock. NMFS has developed management measures in this EIS to reduce dusky shark bycatch mortality in the commercial and recreational shark fisheries to meet the bycatch mortality reductions recommended by the stock assessment. Collectively, the preferred alternatives are expected to reduce dusky shark mortality overall by at least35 percent. This reduction will be achieved through a combination of measures that would reduce bycatch, reduce discard mortality rates, increase compliance with prohibited species regulations, and improve data collection on dusky shark catch. This chapter details the environmental effects of the alternatives.

4.1 Ecological Evaluation

4.1.1 Recreational Alternatives

NMFS is considering several recreational alternatives that would reduce dusky shark mortality and meet the objectives stated in Chapter 1.0. The alternatives, which are listed below, range from maintaining the status quo under the No Action alternative to allowing only catch and release recreational shark fishing.

Alternative A1: No Action. Do not implement management measures to end overfishing and rebuild dusky sharks in the Atlantic recreational shark fishery

Alternative A2: *Require HMS permit holders fishing for sharks recreationally to obtain a shark endorsement, which requires completion of an online shark identification and fishing regulation training course – Preferred Alternative*

Alternative A3: Require HMS permit holders fishing for sharks recreationally to have a NMFS-approved shark identification placard onboard when fishing for and/or retaining sharks.

Alternative A4: Prohibit retention of all ridgeback sharks in the Atlantic recreational shark fishery. Oceanic whitetip, tiger, and smoothhound sharks would be prohibited from retention.

Alternative A5: Increase the recreational minimum size to 89 inches fork length for all sharks.

Alternative A6: Recreational Circle Hook Alternatives

Alternative A6a: *Require the use of circle hooks by all HMS permit holders fishing for sharks recreationally (bait and leader definition). – Preferred Alternative*

Alternative A6b: Require the use of circle hooks by all HMS permit holders with a shark endorsement when fishing for sharks recreationally (bait and hook size definition).

Alternative A6c: Require the use of circle hooks by all Atlantic HMS permit holders participating in fishing tournaments when targeting or retaining Atlantic sharks.

Alternative A7: Allow only catch and release of all Atlantic sharks by HMS permit holders. Anglers could fish for and target sharks but retention of recreationally-caught sharks would be prohibited.

Alternative A1
Alternative A1 would not implement any management measures in the recreational shark fishery to decrease mortality of dusky sharks, likely resulting in direct, short- and long-term, minor adverse ecological impacts. Based on the results of the SEDAR 21 stock assessment, NMFS has determined that dusky sharks are overfished and experiencing overfishing. If no management measures are implemented to reduce dusky shark mortality in the recreational shark fishery, overfishing could continue.

Indirect short- and long-term ecological impacts to incidentally caught species and EFH would likely be neutral. Recreational fishermen typically use rod and reel gear, which rarely contacts the benthic habitat. Furthermore, the gear is actively managed and non-target species are usually released quickly in a manner that maximizes the chance for survival. Thus, indirect ecological impacts are likely neutral.

When considered in the context of management measures in the past, present, and foreseeable future, the cumulative impacts of Alternative A1 would be minor and adverse, the same as the direct ecological impacts discussed above. The analysis above takes into account past and present management measures while discussing ecological impacts.

Alternative A2– Preferred Alternative
Under Alternative A2, recreational fishermen that fish for, retain, posses, or land sharks must obtain a shark endorsement in addition to other permit requirements. Obtaining the shark endorsement would be included in the online HMS permit application and renewal process and would require the applicant to complete a quiz focusing on shark species identification. Atlantic tunas General category and Swordfish General Commercial permit holders would also have to obtain a shark endorsement for use during registered tournaments. This alternative would likely result in short- and long-term moderate beneficial ecological impacts. Currently, dusky sharks are prohibited in the recreational fishery in federal and state waters. Continued landing of dusky sharks by recreational fishermen, then, is likely a result of either species misidentification or a lack of knowledge about prohibited shark species regulations. Alternative A2 would address both of these causes. The application process for the shark endorsement would provide NMFS an opportunity to conduct focused outreach to recreational shark fishermen, and that outreach would be designed to increase their awareness of regulations, improve their ability to identify and release dusky sharks, and improve their handling of mistakenly-caught dusky sharks to increase their survival. An online quiz would improve and test their ability to identify prohibited shark species (e.g. most ridgeback sharks, those with an interdorsal ridge, are prohibited), information on current recreational regulations, and a reminder that dusky sharks are prohibited. This focused outreach would reduce dusky shark mortality in the recreational fishery and thus provide moderate beneficial ecological impacts for the stock. Furthermore, with the list of shark

endorsement holders NMFS anticipates conducting more targeted surveys to increase the reliability of recreational shark catch estimates.

In concert with targeted outreach through the shark endorsement, Alternative A2 would also include the development of a coordinated outreach, education, and enforcement campaign to reduce dusky shark mortality (through safe handling and release methods), improving regulatory compliance on prohibited species, and improving species identification and monitoring of catches in the recreational fishery. NMFS would coordinate with the Atlantic and Gulf States Marine Fisheries Commissions and coastal states as part of this outreach, education, and enforcement campaign to improve dusky shark identification and regulatory compliance in state waters. Because Alternative A2 would result in increased knowledge of the regulations and improved identification and safe handling abilities of all recreational shark fishermen it would reduce landings of dusky sharks as a result of misidentification, and NMFS prefers this alternative at this time.

Indirect short- and long-term minor beneficial ecological impacts would be expected from Alternative A2. Recreational fishermen typically use rod and reel gear, which rarely contacts the benthic habitat, thus, impact to EFH would likely be neutral. However, other non-target species of sharks that are caught incidentally also would benefit from decreased misidentification, particularly sharks that are currently prohibited.

When considered in the context of management measures in the past, present, and foreseeable future, the cumulative impacts of Alternative A2 would be moderate and beneficial, the same as the direct ecological impacts discussed above. The analysis above takes into account past and present management measures while discussing ecological impacts.

Alternative A3

Alternative A3 would require participants in the recreational shark fishery to carry an approved shark identification placard on board the vessel when fishing for sharks. This alternative would likely result in short- and long-term minor beneficial ecological impacts. Currently, dusky sharks are prohibited in the recreational fishery and NMFS has provided shark identification placards upon request for several years. Continued landings of dusky sharks by recreational fishermen, then, is likely a result of either species misidentification or a lack of knowledge about prohibited shark species regulations. Alternative A3 could address both of these causes through focused outreach, though not to the extent that Alternative A2 could. Alternative A3 provides for a more passive learning experience and does not provide feedback to the angler on correct identification like the online quiz in Alternative 2. While the angler would be required to carry a placard that could help identify dusky sharks and include information on prohibited species, NMFS could not require the angler to reference the material.

Indirect short- and long-term minor beneficial ecological impacts would be expected from Alternative A3. Recreational fishermen typically use rod and reel gear, which rarely contacts the benthic habitat, thus, impact to EFH would likely be neutral. However, other non-target species of sharks that are caught incidentally would benefit from decreased misidentification, particularly sharks that are currently prohibited.

When considered in the context of management measures in the past, present, and foreseeable future, the cumulative impacts of Alternative A3 would be minor and beneficial, the same as the direct ecological impacts discussed above. The analysis above takes into account past and present management measures while discussing ecological impacts. In the future, additional rulemakings to address dusky shark mortality are possible, if appropriate.

Alternative A4

Alternative A4 would prohibit retention of all ridgeback sharks in the Atlantic recreational shark fishery. Oceanic whitetip, tiger, and smoothhound sharks, which currently may be legally retained under certain circumstances, would be prohibited from retention. Other ridgeback sharks (including dusky sharks) are already prohibited species.

The prohibition on landing most ridgeback sharks (including dusky sharks) in the recreational fishery was originally implemented, in part, to provide a simple means of determining whether a shark could be retained. (73 FR 40658; July 15, 2008) Under Alternative A4, NMFS would extend the prohibition on retention of ridgeback sharks for recreational fishermen to include oceanic whitetip, tiger sharks, and smoothhound sharks. Under this alternative, ridgeback sharks would be defined as those sharks with an interdorsal ridge. Sharks with a "ridgeback," are easily identifiable, often at distance. Widely prohibiting all ridgeback sharks would simplify both outreach and compliance with regulations for recreational shark fisheries. Due to difficulties associated with differentiating between shark species, relying on a single identification characteristic such as an interdorsal ridge, would simplify outreach and compliance to help reduce the number of landings of dusky sharks. However, oceanic whitetip, tiger, and smoothhound sharks have other more readily identifiable features that easily distinguish them from other ridgeback species.

The Marine Recreational Information Program (MRIP) recreational harvest data from 2008-2015 for tiger, oceanic whitetip, smoothhound, and dusky sharks for both state and federal fisheries. These data suggest that, of these four species, smoothhound sharks are the most commonly caught (Table 4.1), though there was no information available for oceanic whitetip sharks. The table shows that tiger sharks, while sometimes harvested in the recreational fishery, only make up 0.1 percent of the total recreational sharks harvest, and a prohibition on tiger shark retention may not have a large impact on reducing dusky shark mortality. For oceanic whitetip sharks, data are not available since catch of this species is rare. Consequently, a prohibition on oceanic whitetip sharks is unlikely to have a large impact in the recreational fishery on reducing dusky shark mortality. Smoothhound sharks, on the other hand, make up a sizeable portion of the recreational shark fishery in terms of landings. It is important to note, however, that it is not possible to separate MRIP catch data by federal and state permits. Because this action would only affect federally permitted anglers (unless states decided to match federal regulations), not all of the catch in Table 4.1would be precluded. Presumably, state-permitted anglers are responsible for some of the catch and, for species such as smoothhound sharks that are often caught in state waters, state-permitted anglers may be responsible for most of the catch. Thus, a federal prohibition on the retention of smoothhound sharks may have a minor impact in the recreational fishery on reducing dusky shark mortality.

Under this alternative, the prohibition on retention of ridgeback sharks in conjunction with outreach to promote the ridgeback prohibition may reduce the number of dusky sharks retained in the recreational fishery. Thus, Alternative A4 would likely result in both direct short- and long-term, minor beneficial ecological impacts on dusky sharks. Although this alternative might have beneficial ecological impacts, it is not preferred because these additional species are more readily identifiable from other ridgeback species, and other alternatives have a better chance to provide beneficial impacts and do not further restrict the number of sharks available for recreational retention.

Indirect short- and long-term minor beneficial ecological impacts would be expected from Alternative A2. Recreational fishermen typically use rod and reel gear, which rarely contacts the benthic habitat, thus, impact to EFH would likely be neutral. However, other non-target species of sharks that are caught incidentally would benefit from decreased misidentification, particularly sharks that are currently prohibited.

When considered in the context of management measures in the past, present, and foreseeable future, the cumulative impacts of Alternative A4 would be minor and beneficial, the same as the direct ecological impacts discussed above. The analysis above takes into account past and present management measures while discussing ecological impacts.

Table 4.1 For-hire and private harvest estimates (retained or discarded dead) of additional ridgeback sharks to prohibit in the shark recreational fishery. Source: MRIP Database (2008-2015).

Shark Species	Total Harvest	Average Annual Harvest	Percentage of Total Harvest of All Sharks
Tiger sharks	1,108	110	0.1 %
Oceanic whitetip sharks	Data not available	Data not available	Data not available
Smoothhound sharks	246,181	29,484	19.0 %
Dusky sharks	2,609	434	0.2 %

Alternative A5

Under Alternative A5, the minimum recreational size limit for authorized shark species, except for Atlantic sharpnose, bonnethead, and hammerhead (great, scalloped, and smooth) sharks, would increase from 54 to 89 inches fork length. The 89 inch fork length size limit is based on the best available scientific information for dusky sharks from Natanson et al. (2013), which reported female dusky shark size-at-maturity to be 227 cm fork length (approximately 89 inches). As the current recreational size limit of 54 inch fork length for authorized shark species is based on scientific data for sandbar sharks, increasing the minimum recreational size limit to 89 inches fork length would reduce the likelihood of mistaken landings of sexually immature dusky sharks in addition to reducing the likelihood of mistaken landings of sexually immature sandbar sharks. This measure could provide protection for the most sensitive life stages of dusky sharks and additional protection for immature dusky sharks. While dusky sharks have been prohibited in the recreational fishery since 1999, they are still landed in the recreational shark fishery, likely due to species misidentification issues. This measure might provide some assurance that any dusky sharks that are retained due to species misidentification would be from a less sensitive life stage. Because NMFS survey data suggest that the majority of recreationally

caught dusky sharks are smaller than 89 inches fork length (Salz, 2013), Alternative A5 would likely result in both direct short- and long-term, minor beneficial ecological impacts for dusky sharks since fishing mortality would be reduced, particularly in the most sensitive life stages (juveniles and sub-adults). It is important to note, however, that the minimum size would only apply to federal recreational fishermen and would not apply to state water fishermen exclusively fishing in state waters, potentially diminishing the benefits. There would be both indirect short- and long-term, moderate beneficial impacts on a number of recreationally caught shark species. Ecological benefits would be expected for a number of recreationally caught shark species, as most do not reach or are rarely caught with lengths exceeding 89 inches fork length. Consequently, as a result of Alternative A5, dusky shark fishing mortality from the recreational fishery would be reduced.

When considered in the context of management measures in the past, present, and foreseeable future, the cumulative impacts of Alternative A5 would be minor and beneficial, the same as the direct ecological impacts discussed above. The analysis above takes into account past and present management measures while discussing ecological impacts. In the future, additional rulemakings to address dusky shark mortality are possible, if appropriate.

The measure outlined in Alternative A5 was in a preferred alternative in the Amendment 5 proposed rule. At the time of publication of the Amendment 5 proposed rule, NMFS preferred to raise the minimum size for all sharks in the recreational fishery since it would provide protections for dusky sharks that are misidentified. During the public comment period, however, many comments were submitted in opposition to this measure. Some comments focused on safety-at-sea issues, noting that large sharks are difficult to handle and introduce unique risks. Other comments suggested that such a large minimum size would effectively exclude many participants from the recreational shark fishery since many fishermen do not have gear or boat size to accommodate large sharks. The North Carolina Department of Marine Fisheries expressed concern that the larger minimum size could encourage harvest of mature dusky sharks. Based, in part, on these comments and the development of other alternatives that could protect dusky sharks with lesser impacts to fishermen, NMFS does not prefer Alternative A5 at this time.

Alternative A6 – Circle Hook Alternatives

Alternative A6a– Preferred Alternative

Under Alternative A6a, circle hooks would be required for HMS permit holders fishing recreationally for sharks. Fishermen deploying natural bait while using a wire or heavy (200 lb test or greater) monofilament or fluorocarbon leader would be presumed to be fishing for sharks. Most evidence suggests that circle hooks reduce shark at-vessel and post-release mortality rates without reducing catchability compared to J-hooks, although it varies by species, gear configuration, bait, and other factors. Willey et al. (2016) found that 3 percent of sharks caught recreationally with circle hooks were deep hooked while 6 percent caught on J-hooks were deep hooked. Campana et al. (2009) observed that 96 percent of sharks that were deep hooked were severely injured or dead while 97 percent of sharks that were hooked superficially (mouth or jaw) were released healthy and with no apparent trauma. As deep hooked sharks are more likely to die, Willey et al.'s (2016) results indicate circle hooks could reduce mortality of sharks deep-

hooked by J-hooks by approximately 48 percent (i.e., a 50 percent reduction from 96 percent deep hooked sharks). For this reason, Alterative A6a would likely have direct moderate beneficial impacts in both the short- and long-term for dusky sharks. Dusky sharks that are inadvertently caught in the recreational fishery would be more easily released in better condition, reducing dead discards and post-release mortality. Since circle hooks likely provide similar benefits to many fish species, Alternative A6a would likely have indirect moderate beneficial impacts in both the short- and long-term since other species could similarly be released more easily and in better condition. For these reasons, NMFS prefers this alternative at this time.

When considered in the context of management measures in the past, present, and foreseeable future, the cumulative impacts of Alternative A6a would be moderate and beneficial, the same as the direct ecological impacts discussed above. The analysis above takes into account past and present management measures while discussing ecological impacts.

Alternative A6b

The intent of Alternative A6b is the same as Alternative A6a, to require the use of circle hooks when recreationally fishing for sharks; however, Alternative A6b differs in how recreational shark fishing is defined. Under Alternative A6b fishermen would be presumed to be fishing for sharks when deploying natural bait while using a 5/0 or larger hook size (Alternative A6a used natural bait and leader type to identify recreational shark fishing). All the benefits of circle hooks described above in Alternative A6a would apply to Alternative A6b. Thus, Alterative A6b would likely have direct moderate beneficial impacts in both the short- and long-term for dusky sharks since individuals inadvertently caught in the recreational fishery could be more easily released in better condition, reducing dead discards and post-release mortality. Since circle hooks likely provide similar benefits to many fish species, Alternative A6b would likely have indirect moderate beneficial impacts in both the short- and long-term since other species could similarly be released more easily and in better condition. Although Alternative A6b could provide beneficial impacts for dusky sharks, at this time, NMFS prefers to identify recreational shark fishermen based on natural bait and leader type rather than natural bait and hook size. Although NMFS does not prefer Alternative A6b at this time, the Agency requests comment on the best way to identify recreational shark fishing to ensure that the entire category is included. When considered in the context of management measures in the past, present, and foreseeable future, the cumulative impacts of Alternative A6a would be moderate and beneficial, the same as the direct ecological impacts discussed above. The analysis above takes into account past and present management measures while discussing ecological impacts.

Alternative A6c

Under Alternatives A6c, circle hooks would be required for HMS permit holders participating in fishing tournaments that bestow points, prizes, or awards for sharks. As discussed under Alternative A6a, the use of circle hooks could reduce dead discards of sharks, including dusky sharks. As such, many of the same ecological benefits would occur with Alternative A6c as would under Alternative A6a. However, since the shark tournament fishery is smaller than the larger federal recreational shark fishery, the ecological benefits would be somewhat diminished. For this reason, Alterative A6c would likely have direct minor beneficial impacts in both the short- and long-term for dusky sharks. Since circle hooks likely provide similar benefits to many fish species, Alternative A6c would likely have indirect minor beneficial impacts in both

the short- and long-term since other species could similarly be released more easily and in better condition.

When considered in the context of management measures in the past, present, and foreseeable future, the cumulative impacts of Alternative A6c would be minor and beneficial, the same as the direct ecological impacts discussed above. The analysis above takes into account past and present management measures while discussing ecological impacts.

Alternative A7
Under Alternative A7 recreational fishermen may still fish for and target authorized shark species, though retaining any shark species would be prohibited (i.e., catch and release only would be permitted). Although some post-release mortality would be expected, Alternative A7 would result in beneficial ecological impacts by significantly decreasing fishing mortality of dusky sharks. Precluding any shark retention by recreational fishermen should virtually eliminate cases of recreational fishermen landing dusky sharks. Some dusky shark mortality may still occur when dusky sharks are inadvertently hooked (although safe handling protocols and circle hooks should decrease such mortality). Thus, Alternative A7 would likely result in both direct short- and long-term, moderate beneficial ecological impacts on dusky sharks. There would also be both indirect, short- and long-term, moderate beneficial ecological impacts on additional shark species targeted in recreational shark fisheries.

Based on the available data, which remain uncertain as described in Chapter 3.0, the entire U.S. Atlantic, Gulf of Mexico, and Caribbean Sea, from 2008 through 2015 (Section 3.4.2.2), average annual landings of all sharks were approximately 161,602 fish. Under Alternative A7, all of these landings would be prohibited, nearly eliminating all recreational shark landings. As evidenced by the number of dusky sharks landed (estimated annual average of 326), a prohibition on landing does not completely eliminate the practice. However, it is likely that most of the prohibited shark landings were due to misidentification rather than intentional violations. Consequently, an across-the-board prohibition on all sharks would likely result in a moderate reduction in landings for all sharks species, including dusky sharks, which experiences approximate average annual landings of 326 sharks according to the available data. Given that this measure would aim to eliminate landings of many thousands of sharks to address the mortality of a few hundred dusky sharks, it is overly broad and not preferred.

When considered in the context of management measures in the past, present, and foreseeable future, the cumulative impacts of Alternative A7 would be moderate and beneficial, the same as the direct ecological impacts discussed above. The analysis above takes into account past and present management measures while discussing ecological impacts.

4.1.2 Commercial Alternatives

NMFS is considering several commercial alternatives that would reduce dusky shark mortality and meet the objectives described in Chapter 1.0. The alternatives are listed below.

Alternative B1: No Action. Do not implement management measures to end overfishing and rebuild dusky sharks in the commercial Atlantic pelagic longline fishery.

Alternative B2: Fishermen with an Atlantic shark limited access permit and pelagic longline gear onboard would be limited to 750 hooks per pelagic longline set and no more than 800 assembled gangions onboard at any time.

Alternative B3: *Fishermen with an Atlantic shark limited access permit with pelagic longline gear onboard must release all sharks not being retained using a dehooker or cutting the gangion less than three feet from the hook.* – Preferred Alternative.

Alternative B4: Develop dusky shark hotspot closure areas for HMS vessels fishing with pelagic longline gear.

Alternative B4a: Charleston Bump Hotspot Closure (May)
Alternative B4b: Hatteras Shelf Hotspot Closure (May)
Alternative B4c: Hatteras Shelf Hotspot Closure (June)
Alternative B4d: Hatteras Shelf Hotspot Closure (November)
Alternative B4e: Mid-Atlantic Bight Canyons Hotspot Closure (October)
Alternative B4f: Southern Georges Bank Hotspot Closure (July)
Alternative B4g: Southern Georges Bank Hotspot Closure (August)
Alternative B4h: Charleston Bump Hotspot Closure (November)
Alternative B4i: Allow conditional access to dusky shark hotspot closure areas for HMS vessels fishing with pelagic longline gear
Alternative B4j: Implement dusky shark bycatch caps in the pelagic longline fishery

Alternative B5: *Require completion of a shark identification and fishing regulation training as a new part of the safe handling and release workshop for HMS pelagic longline, bottom longline, and shark gillnet vessel owners and operators* – Preferred Alternative.

Alternative B6: *Increase dusky shark outreach and awareness through development of additional commercial fishery outreach materials, and require pelagic longline, bottom longline, and gillnet vessels to abide by a dusky shark fleet communication and relocation protocol* – Preferred Alternative.

Alternative B7: Request that certain states (NJ, DE, MD, VA) and the ASMFC extend end of existing shark closure from July 15 to July 31.

Alternative B8: Close the Atlantic HMS pelagic longline fishery.

Alternative B9: *Require the use of circle hooks by all HMS shark directed limited access permit holders in the bottom longline fishery* – Preferred Alternative.

Alternative B10: Establish Individual Dusky Bycatch Quotas (IDQs) in the Pelagic Longline and Bottom Longline Fisheries

Alternative B1

Under Alternative B1, NMFS would not implement any management measures to reduce dusky shark mortality in the Atlantic commercial HMS fisheries. NMFS has determined that dusky sharks are overfished and experiencing overfishing. If no management measures are implemented to reduce dusky shark mortality in the Atlantic commercial HMS fisheries, fishermen would continue to fish under current regulations, and direct minor, adverse, short- and long-term ecological impacts would likely occur since overfishing would continue. Indirect short- and long-term ecological impacts to incidentally caught species, and cumulative impacts, would likely be neutral, as current commercial pelagic longline fishing practices would not change.

Alternative B2
Under Alternative B2, fishermen with an Atlantic shark limited access permit that have pelagic longline gear onboard would be limited to 750 hooks per pelagic longline set with no more than 800 assembled gangions onboard the vessel at any time. Overall, limiting the number of hooks could have direct short- and long-term minor, beneficial ecological impacts, because the hook restriction has the potential to reduce or cap interactions with dusky sharks caught on pelagic longline gear.

We selected 750 hooks per pelagic longline set with no more than 800 assembled gangions onboard the vessel at any time because this would result in a partial reduction in the numbers of hooks set in the pelagic longline fisheries, and prevent any increases in effort. The average number of hooks per pelagic longline set varied based on the target species as well as the average number of sets per pelagic longline trip (Table 4.2). The average number of hooks used on pelagic longline sets targeting swordfish, bigeye tuna, yellowfin tuna, mixed tuna species, shark, other species, and mix of species falls below the potential hook restriction of 750, but the restriction puts a cap on the number of hooks that can be used, which could be beneficial in the future if fishing practices change. This alternative could result in a reduction in the number of hooks per set when compared to the average number of hooks used on pelagic longline sets targeting dolphin (1,066 hooks) and could be beneficial for the dusky shark stock. This alternative could also result in an increase in the number of hooks per set when compared to the average number of hooks used on pelagic longline sets targeting all other species including swordfish and yellowfin tuna, which could result in negative impacts on dusky sharks if fishermen change their effort in order to maximize the number of hooks they could use. In general, the number of sets per pelagic longline trip targeting each species is the same. Thus, this hook restriction would likely lead to indirect short- and long-term minor, beneficial ecological impacts on other species that are incidentally caught on pelagic longline gear, because limiting the number of hooks per set would likely reduce pelagic longline fishing effort. Cumulative impacts most likely would be neutral as the reduction in pelagic longline effort that would occur from this alternative would be unlikely to make a substantial impact on the ecosystem as a whole. However, limits on the number of hooks can be counteracted by increasing longline soak times, thus potentially negating expected reductions in effort. Additionally, dusky sharks are caught in other fisheries beyond only the HMS pelagic longline fishery. For these reasons, this alternative is not preferred at this time.

Based upon public comments, and other information, it is possible the number of hooks/gangions in this alternative could be adjusted if this alternative were to become preferred.

Table 4.2 Average Number of Hooks per Pelagic Longline Set (2008-2015). Source: 2015 Atlantic HMS SAFE Report, 2015 Fisheries Logbook System.

Target Species	Average Number	2008	2009	2010	2011	2012	2013	2014	2015	Average
Swordfish	Hooks per Pelagic Longline Set	708	687	759	728	683	735	780	729	726
Bigeye tuna	Hooks per Pelagic Longline Set	751	755	653	802	865	620	811	641	737
Yellowfin tuna	Hooks per Pelagic Longline Set	678	689	687	645	628	638	608	571	643
Mix of tuna species	Hooks per Pelagic Longline Set	747	744	837	786	728	694	64	653	657
Shark	Hooks per Pelagic Longline Set	377	354	455	348	525	NA	293	298	379
Dolphin	Hooks per Pelagic Longline Set	989	1,033	1,131	1,082	1,129	933	1,093	1,140	1,066
Other species	Hooks per Pelagic Longline Set	NA	NA	467	400	300	NA	NA	150	329
Mix of species	Hooks per Pelagic Longline Set	749	781	761	749	758	717	722	737	747

Alternative B3– Preferred Alternative

Under Alternative B3, a preferred alternative, fishermen with an Atlantic shark commercial permit fishing with pelagic longline gear would be required to release all sharks that are not being boarded or retained by using a dehooker, or by cutting the gangion no more than three feet from the hook. Currently, pelagic longline fishermen are required to use a dehooking device to release marine mammals and sea turtles safely and with minimal harm. Fishermen are also required to release all HMS that are not retained in a manner that will ensure maximum probability of survival without removing the fish from the water. Under this alternative, if a shark is caught on pelagic longline gear and not retained, fishermen would be required to release the shark by cutting the line no more than three feet from the hook or by using a dehooking device, in either case without removing the shark from the water. This release requirement would be applied to all sharks, due to the difficulties in identifying dusky sharks from other shark species. Many pelagic longline fishermen already release sharks they are not intending to keep by cutting the line. However, under this alternative, fishermen would be required to release sharks in a manner that removes either all or most of the gear. This approach is similar to the approach required when releasing sea turtles and marine mammals, in that such animals released with a minimum of gear are assumed to have a greater likelihood of surviving. A study on recreationally caught thresher sharks (Sepulveda et al. 2015), suggested that sharks that had ~2 m of trailing gear had 88 percent higher mortality rates than those without. NMFS Tech Memo OPR-29 on marine turtle mortality indicates that reducing gear left on sea turtles reduces post-

interaction mortality of mouth-hooked turtles by 25-33 percent, supporting the approach that reducing trailing gear on animals generally improves post-release survival. Thus, reducing the amount of trailing gear on the shark should maximize the potential survival of the released sharks. As such, this alternative is anticipated to have direct short- and long-term minor, beneficial ecological impacts, because using a dehooker or cutting the gangion no more than three feet from the hook would reduce the amount of trailing gear attached to released dusky sharks, which would contribute in decreasing post-release mortality. Indirect short- and long-term minor, beneficial ecological impacts to incidentally caught species as other incidentally this release requirement would also likely reduce post-release mortality for other species of sharks caught incidentally. Cumulative impacts could be minor and beneficial, especially if fishermen apply this requirement to releasing sharks in other fisheries in which they may participate.

Alternative B4 – Hotspot Closure Alternatives

Alternative B4 would create eight dusky shark hotspot closures for vessels fishing with pelagic longline gear. The hotspot gear restricted areas would be in areas and times where recent (2008-2014) HMS logbook data have shown higher levels of interactions with dusky sharks on pelagic longline gear. We analyze both the effects of the closures and of expected redistribution of fishing effort below. The following sections summarize the methodology used to create estimates of redistribution of fishing effort. The ecological impacts of each individual hotspot closure and of all hotspot closures combined are provided below.

Data Sources

Fishery dependent data were used to determine the current levels of dusky shark interactions in each fishery. NMFS considered data from the HMS Logbook to compile information from limited access permit holders fishing with pelagic longline gear. Pelagic longline fishermen report harvest and discard data on a set specific basis. These reports include location data (latitude and longitude coordinates). Using this location data, NMFS can delineate dusky shark interactions on individual sets and in specific areas.

For these analyses, NMFS used the HMS logbook data rather than observer data to calculate dusky shark interactions because logbook data are collected across all HMS-permitted participants in the pelagic longline fishery, thus alleviating the need to extrapolate interactions for the entire fishery based on observed trips. NMFS feels that fishery dependent HMS logbook data provide the most straightforward approach for determining spatially-explicit interactions of dusky sharks within the pelagic longline fishery. Logbook data are self-reported, and therefore, could under- or over-represent the number of interactions of dusky shark. Observer data also have constraints; they do not cover the entire fleet and extrapolations would not provide the spatial detail needed to define the smallest areas for potential closures. Finally, observer and logbook data are both presented in the Amendment 5b Predraft, with the limited observer data helping to validate the use of more widespread logbook data, and observer data generally corroborated the dusky shark distribution trends for the time period analyzed in the Predraft (2008 – 2012); hotspots in the logbook data tended to also encompass areas where higher numbers of dusky sharks are reported in observer data.

In order to determine the total dusky shark interactions, NMFS used the number of interactions reported in the HMS logbook from 2008-2014. Extending the time series further back in time to

include additional years might encompass fishing effort that occurred under different regulations, prior to the extensive measures adopted in Amendment 2 in 2008 and prior to the adoption of the dusky shark rebuilding plan in that Amendment, making them less representative of the current regulatory environment. NMFS has received comments from pelagic longline fishermen requesting that the Agency include landings of designated target species (primarily dolphinfish) reported in the Coastal Fisheries Logbook in calculations and models used to assess biological and socio-economic impacts of rulemaking alternatives. In general, the Coastal Fisheries Logbook is used by directed and incidental shark permit holders fishing with bottom longline and gillnet gear that may also be targeting reef fish or other coastal species, while the HMS logbook is used primarily by directed and incidental shark permit holders fishing with pelagic longline for swordfish and tunas. NMFS has decided to not include landings of these species in the Coastal Fisheries Logbook for several reasons:

1. The Coastal Fisheries Logbook would not contain landings of the primary target species of the HMS pelagic longline fishery (swordfish and BAYS tunas).
2. Differential reporting requirements and mechanisms are required for fishermen in the southeast Atlantic, Gulf of Mexico or New England for dolphinfish, which could influence the amount of information available for analysis (and potentially bias results from those analyses). The HMS Logbook is a census across the entire range of the dusky shark and HMS fisheries.
3. The HMS Logbook and the Coastal Fisheries Logbook require different types of data to be reported which creates a mismatch in how the data can be combined and collectively analyzed, which could result in inconsistencies between the two data sets.
4. Specific geographic data (i.e., latitude and longitude for each set) that would were reported in the HMS Logbook and used to identify and evaluate the ecological and economic effects of gear restricted areas are unavailable through the Coastal Fisheries Logbook. Rather, fishermen report location where the majority of all catches of each species were made through reference to a 1º latitude × 1º longitude grid cell in the Atlantic region and larger locations in the Gulf of Mexico. If NMFS were to incorporate data at the finest scale available (1º latitude × 1º longitude), NMFS would have to disregard the overwhelming number of requests for management (and visualization/depiction of data) at a finer scale.
5. The Coastal Fisheries Logbook requires landings per trip to be reported by weight whereas the HMS Logbook requires all interactions per set to be reported by number. Fishermen reporting in the Coastal Fisheries Logbook may report gutted or whole weight.
6. A percentage (20 percent) of fishermen reporting through the Coastal Fisheries Logbook are selected to report discarded fish through a Supplemental Discard and Gear Trip Report form at the trip level whereas all fishermen reporting in the HMS Logbook must provide this information for every set, which also creates a mismatch in how data can be combined and collectively analyzed. Area of capture is reported for each species discarded in the Supplemental Discard and Gear Trip Report form, however the area is based on a 1º lat. x 1º lon. grid and is therefore on a coarser resolution than what is needed to statistically evaluate the hotspot

closures (which are based on a 10' lat. x 10' lon. grid). Because dusky sharks are a prohibited species and cannot be harvested, only participants that are selected to submit discard data would provide any information on dusky shark interactions. If NMFS were to use the Coastal Fisheries Logbook, NMFS would need to extrapolate any dusky shark interactions reported in this discard form across the entire universe of participants using the Coastal Fisheries Logbook in order to arrive at an estimate of dusky interactions. This is not a good approach because it could result in a highly uncertain or potential overestimation of the true number of interactions.

Observer data were utilized for comparison purposes in the analyses presented in the original draft Amendment 5 and Predraft to Amendment 5b. Readers are encouraged to reference maps depicting observer data from the Predraft to Amendment 5b (these analyses are not repeated herein since the observer data tended to reflect the logbook data in terms of the locations with the greatest numbers of dusky shark interactions). We used the available observer data to validate the use of the logbook data.

As described below, each of the hotspot closures alternatives considered would have varying degrees of ecological and economic impacts on different species, dependent on how and to what extent fishing effort is redistributed. The results of these analyses include summary tables that show the anticipated biological impacts on prohibited sharks (dusky, sandbar, night, bignose, white, longfin mako, and bigeye thresher), protected and restricted pelagic longline species (white marlin, sailfish, bluefin tuna, spearfish, sea turtles, hammerhead sharks, silky sharks and oceanic whitetip sharks), HMS and non-HMS designated target species (swordfish, bluefin tuna, yellowfin tuna, bigeye tuna, dolphin, and wahoo), some large coastal sharks (blacktip, spinner, and tiger sharks), and pelagic sharks (blue, shortfin mako, porbeagle, and thresher sharks) based on data reported in the HMS Logbook between 2008 and 2014 that span the various hotspot closed area alternatives (both in time and space). The methods for conducting the redistribution analysis are explained in detail below. The tables describe the impacts of the hotspot closure, with and without redistribution of fishing effort, relative to the area included in the hotspot closure and overall, fishery-wide impacts. In general, the text highlights ecological impacts to target and bycatch species on a fishery-wide basis because that is consistent with how species are managed.

NMFS used a Geographic Information System (ArcGISv10.3) program to plot reported (HMS logbook) dusky shark interactions in the hotspot closures previously identified in the draft Amendment 5 DEIS. Unlike other research on time/area closures (*e.g.*, Block *et al*., 2005), NMFS did not analyze catch-per-unit-effort (CPUE) in terms of soak time (*i.e.*, the number of animals caught per hour of a longline set) because of the variability between fishermen in reporting the soak time per set. NMFS determined that the uncertainty associated with this measure was too high to accurately calculate effort in terms of soak time. Rather, NMFS considered absolute numbers of interactions and average annual numbers of interactions (calculated by summing all reported interactions in 10' x 10' grid cells and dividing by the number of years considered, 2008 – 2014, 7 years) as the most appropriate measures to evaluate the formerly hotspot closures as a means to achieve reductions in dusky shark interactions.

Redistribution of Effort

NMFS analyzed the effects of each hotspot closure area on a fishery-wide level (i.e., across the pelagic longline fleet) using individual vessel CPUEs and effort. Pelagic longline set data from 2008-2014 were plotted using ArcGIS 10.3. The same method that was used to determine the level of pelagic longline effort in Amendment 7 was used in this Amendment. The natural breaks identified in Amendment 7 are shown in the histogram (Figure 4.1) and are used as thresholds for which a vessel would redistribute its effort. Vessels that had less than or equal to 40 percent of their sets inside a hotspot closure area had 100 percent of their effort redistributed to outside the hotspot closure area; vessels that had between 40 and 75 percent of their sets inside a hotspot closure area had 50 percent of their effort redistributed to outside the hotspot closure area; and vessels that made greater than 75 percent of their sets inside a hotspot closure area had none of their effort redistributed and were captured in the no redistributions calculations. Summary data tables (Table 4.3 - Table 4.42) that describe ecological impacts (both with and without redistribution of effort, depending on the alternative) for each hotspot closure area can be found under the description of ecological impacts for each alternative.

In addition to fleet-wide analyses, NMFS calculated the ecological impacts of redistribution of effort on an individual vessel level for all hotspot closure area alternatives. NMFS calculated vessel-specific, regional CPUE rates for each species and disposition (landed, discarded dead, and discarded alive). First, NMFS totaled all the landings and discards for primary target and bycatch species, by number of animals, in the logbook data by vessel and U.S. domestic pelagic longline statistical area. A sum of the total number of hooks fished by each vessel in each U.S. domestic pelagic longline statistical area was calculated. To determine the regional CPUE for each species and each vessel, in fishing each hotspot closure area, NMFS divided the total number of each species landed and discarded by the sum of hooks fished within each statistical reporting area. The calculation of CPUE was incorporated as a step in the redistribution model and CPUE data are not presented herein.

NMFS calculated the percent frequency of sets made in open portions of U.S. domestic statistical reporting areas (outside of the hotspot closure area) for each vessel during the period of restriction to identify probable redistribution areas for each vessel. The total number of hooks displaced due to the hotspot closure area was calculated for each vessel. The respective redistribution percentages (100 percent or 50 percent) were applied to the displaced hooks. The portion of displaced hooks was multiplied by the percent frequency of sets made in each of the U.S. domestic pelagic longline statistical reporting areas outside of the hotspot closure area. This determined the proportion of displaced hooks to apply to each individual vessel CPUEs for the U.S. domestic pelagic longline statistical area where sets occurred.

Once CPUEs and displaced hooks of each vessel were calculated for each of the U.S. domestic pelagic longline statistical areas, NMFS estimated the number of primary target and bycatch species interactions with redistribution of effort from hotspot closure areas. In past FMPs and FMP Amendments, NMFS used a general method to estimate the impacts of redistribution of effort by the pelagic longline fleet. In the 2006 Consolidated HMS FMP, NMFS assumed that any new closures occurring in the U.S. EEZ would cause effort to be redistributed evenly across

the open areas of the U.S. EEZ. Comments received on that action stated that even distribution across open areas did not accurately reflect historic fishing effort patterns.

In contrast, in the original draft Amendment 5, effort from each proposed closure was redistributed evenly to the respective U.S. domestic pelagic longline statistical area in which each proposed closure occurred. During the comment period on draft Amendment 5, NMFS received a range comments that criticized this approach to the redistribution of effort estimated by NMFS as being too general and not fully describing regional or vessel-specific impacts. Stakeholders requested a vessel-specific estimation of biological and socio economic impacts in addition to fleet-level impacts. NMFS incorporated these comments into the design of a new redistribution model to be used in Amendment 7.

During the draft and final stages of Amendment 7, NMFS did not receive any comments related to the inaccuracy of the redistribution analysis. NMFS calculated the ecological impacts of redistribution of effort on an individual vessel level for all hotspot closure area alternatives. NMFS calculated vessel-specific, regional CPUE rates for each species and disposition (landed, discarded dead, and discarded alive). NMFS developed these methods to use each vessel's unique fishing history to estimate where that vessel would fish if new gear restricted areas were implemented. This method of redistribution represents a more focused approach to estimating how vessels may redistribute their effort and potential impacts on a more localized scale by using vessel- specific fishing history in addition to fleet-wide impacts. In this Amendment, NMFS is using this method to describe the ecological and socio-economic impacts of the hotspot closure area alternatives.

During the original draft Amendment 5 comment period, NMFS considered a hotspot closure for pelagic longline gear in the same area as alternatives B4b, B4c, and B4d. Comments received on the draft Amendment 5 hotspot closure informed NMFS that the affected area was much larger than the closure boundaries, due to the Northwest current of the Gulf Stream. Pelagic longline gear would need to be set further to the southeast to prevent the gear from drifting into the hotspot closure area during the months of May, June, and November, therefore making the Hatteras Shelf hotspot closure affected area much larger. During the consideration of biological and socioeconomic impacts of the Hatteras Shelf hotspot closure area; NMFS delineated a "buffer area" to the south and southwest of the Hatteras Shelf hotspot closure area (Figure 4.2). NMFS used the same calculations for the buffer area that were outlined in the Amendment 7 FEIS in this draft amendment. No comments were received on the inaccuracy of the buffer calculations during the draft and final stages of the Amendment 7 rulemaking process. In the Amendment 7 FEIS, the buffer was delineated using a sample of 1,109 HMS logbook sets off the coast of North Carolina in the mid-Atlantic and South Atlantic Bights between 2006 and 2011. Using this sample of sets, NMFS calculated an average set time of 17 hours per set. A 6 knot (~7 mph) current speed was used as the maximum current speed found in the Cape Hatteras area, based on the same Draft Amendment 5 comments. Based on average soak time and current speed, NMFS determined that an appropriate buffer area extends 119 miles due south from the southernmost seaward point (35º 10' N. Lat., 74º 40' W. Long) of the Hatteras Shelf Hotspot Closure, and due west encompassing all sets to the shore. Figure 4.2 shows the buffer area.
In the original draft Amendment 5 rulemaking, NMFS proposed the utilization of "hotspot closures" that encompassed the areas and times where at least 10 dusky shark interactions were

self-reported by pelagic longline fishermen in the HMS Logbook. The number of hotspots selected represented all areas where more than 10 dusky sharks were reported from 2008 to 2010. The following 8 sub-alternatives revise the anticipated ecological impacts of each hotspot closure alternatives considered through evaluation of additional years (2011-2014) of HMS logbook data and incorporation of the new redistribution model methodology discussed above.

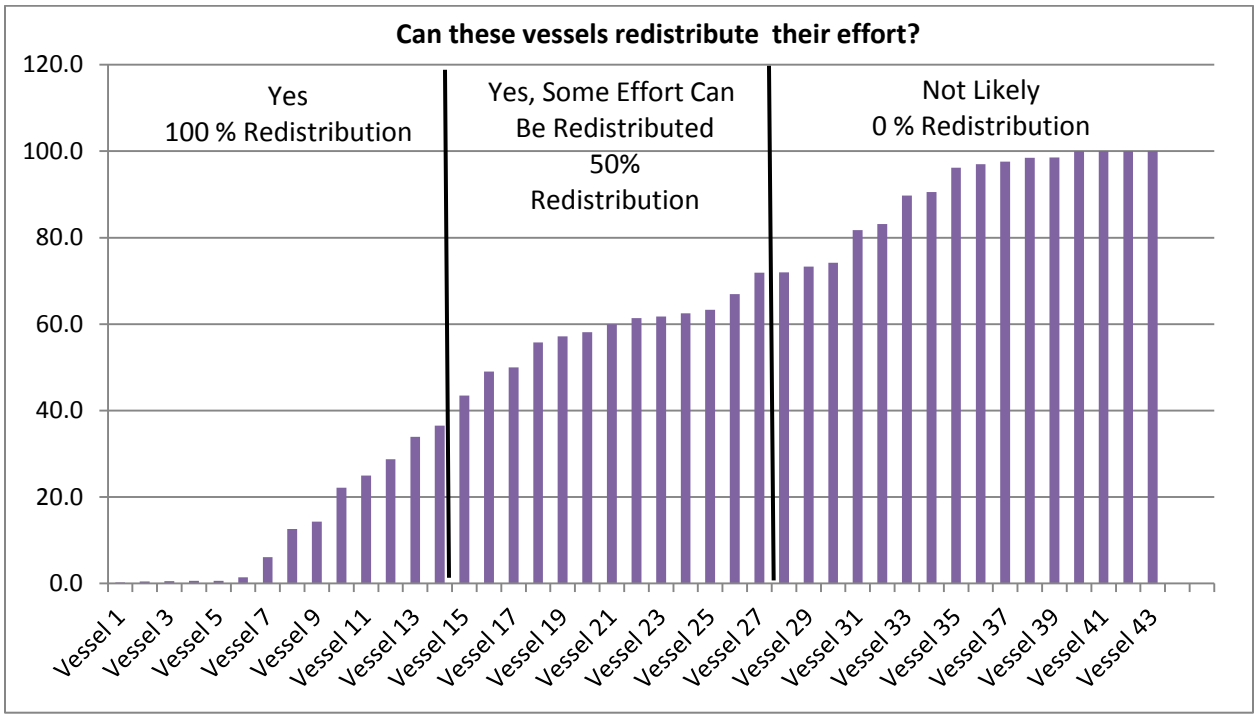

Figure 4.1 Natural categorical percentage breaks (<40 percent; 40 to 75 percent; >75 percent) used for redistribution levels in analysis. Vessels that made between 40 to 75 percent of their sets in the hotspot closure areas were assumed to be able to redistribute 50-100 percent of their effort outside of the hotspot closure areas.

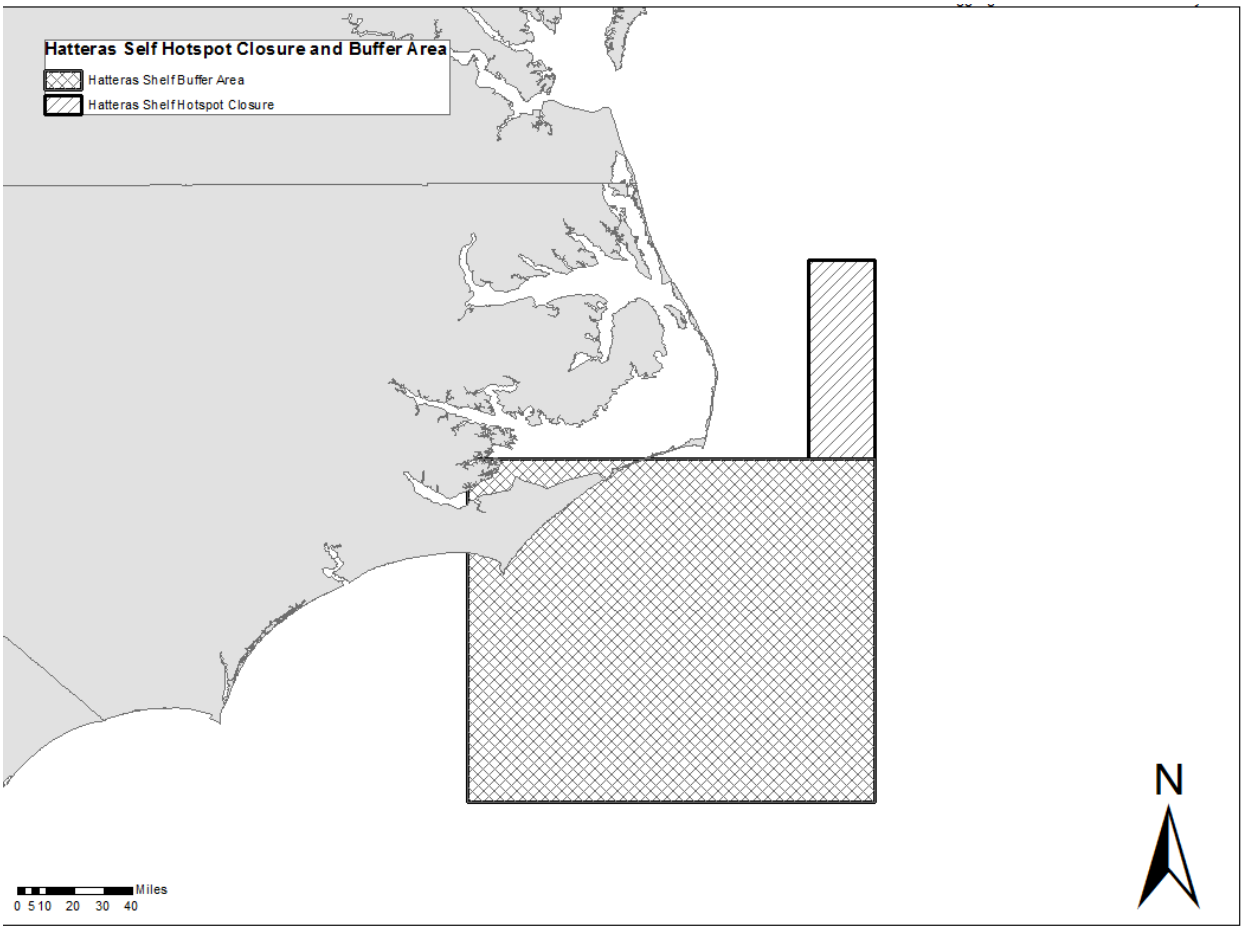

Figure 4.2 Map of Hatteras Shelf Hotspot Closure Area and buffer area.

Alternative B4a: Prohibit the use of pelagic longline gear in HMS fisheries in a portion of the Charleston Bump during the month of May ("Charleston Bump Hotspot May") (Figure 4.3).

Closure of the Charleston Bump hotspot in May (Alternative B4a) would result in short- and long-term direct, minor beneficial ecological impacts on the dusky shark population. The direct ecological impacts on 23 HMS and non HMS-target species, prohibited species, and other bycatch depends on the species and whether interactions increase or decrease after redistribution of fishing effort from the closed area to adjacent open areas in the Charleston Bump. Table 4.3 through Table 4.7 describe the impacts of this hotspot closure for individual species. All of these direct impacts are anticipated to be minor in nature (beneficial or adverse depending on whether or not kept catch and discards decrease or increase) as most changes are less than 10 percent (fishery-wide) with the exception of night shark discards (-16.17 percent) and dolphin discards (-12.50 percent). Given the minor direct impacts on most species, the indirect impacts of alternative B4a on ecosystem function and predator/prey relationships are anticipated to be neutral in the short- and long-term.

The average annual number of hooks set within the entire Charleston Bump in May and the Charleston Bump May hotspot are 250,732 hooks/year and 107,317 hooks/year, respectively (Table 4.5). Approximately 43 percent (= (107,317 / 250,732)*100) of the hooks fished in the

Charleston Bump during the month of May were set within this hotspot closure area. Approximately 477 dusky sharks were reported as discarded from pelagic longline sets within the Charleston Bump in May of 2008-2014; 360 (75 percent) of these animals were reported from this hotspot closure area. Average annual estimated numbers (totals divided by the number of years considered, or 7 years, and rounding up to the nearest whole number) of dusky sharks reported in the entire Charleston Bump in May and in the Charleston Bump May hotspot closure was 69 sharks/year and 52 sharks/year, respectively (without redistribution of effort). Based on the redistribution of effort model, NMFS anticipates that dusky shark interactions could be reduced by 42 sharks/year (- 7.81 percent, fishery-wide), and night shark discards could be reduced by 82 sharks/year (-16.17 percent) fishery-wide (Table 4.3), with the implementation of this hotspot. After redistribution of effort from this hotspot closed area to the open areas of the Charleston Bump, the number of bluefin tuna kept and discarded could increase by four and three fish/year, respectively, implying minor adverse direct ecological impacts on bluefin tuna (Table 4.5).

Direct and indirect, minor, beneficial, ecological impacts for prohibited pelagic longline species and protected resources are expected in the short- and long-term (Table 4.4). Interactions with loggerhead and leatherback sea turtles would be reduced by 1 turtle/year, respectively. Expected changes in the number of interactions with prohibited billfish are less than 1 percent, fishery-wide, as a result of this alternative. Direct ecological effects on hammerhead and oceanic whitetip sharks after redistribution are expected to be neutral (oceanic whitetip, reduction of 0 sharks/year) or minor and positive (hammerhead shark reductions of 10 sharks/year (-0.67 percent, fishery-wide). Reductions in silky shark interactions of 71 sharks/year (-4.12 percent, fishery-wide) were also predicted by the redistribution model, implying minor beneficial ecological effects of this alternative.

Vessels fishing during this time in this hotspot closure are targeting swordfish, yellowfin tuna, bigeye tuna, and dolphin (Table 4.5). After redistribution, this alternative is expected to reduce the number of dolphin kept by 4,346 fish/year (-9.92 percent fishery-wide) and could reduce the number of swordfish kept by 519 fish/year (-1.25 percent) fishery-wide. Model results suggest a minor increase in the numbers of yellowfin tuna retained (+ 62 fish/year, +0.15 percent fishery-wide) and bigeye tuna retained (+83 fish/year, +0.59 percent fishery wide) after redistribution of effort outside of the closure.

Direct ecological effects on select large coastal and pelagic sharks are shown in Table 4.6 and Table 4.7. This hotspot closure alternative is anticipated to have minor beneficial impacts on most shark species analyzed (i.e., anticipated effects are less than a 2 percent increase or reduction, fishery-wide). However, it is expected to have direct minor, beneficial impacts through reductions in the number of common thresher shark discards (-5 sharks/year, -4.55 percent), the number of blacktip sharks discarded (-4 sharks/year, -3.31 percent) and in the number of tiger sharks retained (-1 shark/year, -3.45 percent).

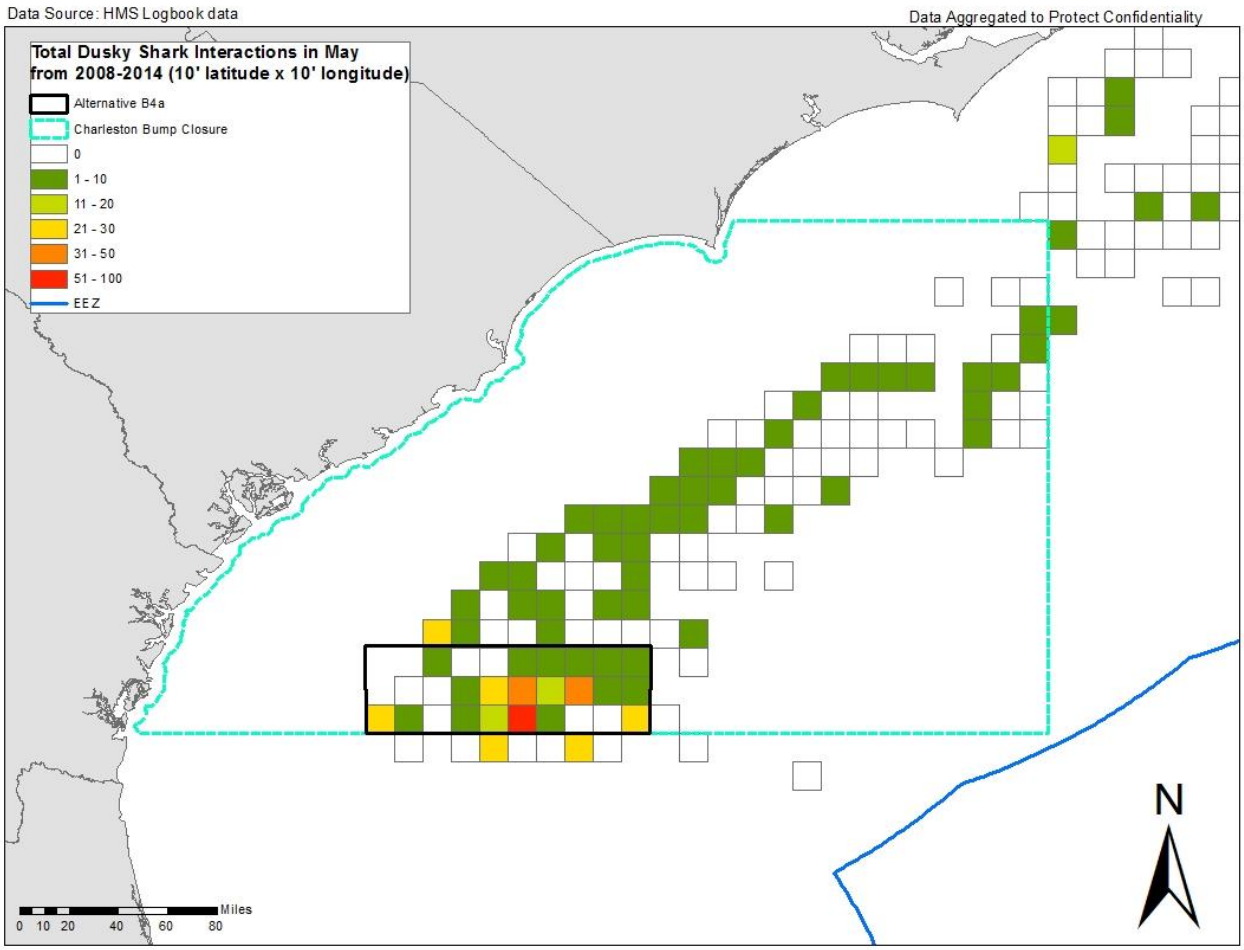

Figure 4.3 Map of total dusky shark interactions occurring in Charleston Bump Hotspot Closure during the month of May and aggregated in 10' X 10' grid cells. Source: HMS Logbook Data from 2008-2014.

Table 4.3 Anticipated ecological impacts on prohibited sharks/bycatch as a result of the pelagic longline Charleston Bump hotspot closure (May). Source: HMS Logbook Data from 2008-2014.

	2008 - 2014 Average Annual Interactions	Dusky Discards	Sandbar Discards	Night Discards	Bignose Discards	White Discards	Longfin Mako Discards	Bigeye Thresher Discards
A	January	4	1	10	0	1	1	6
B	February	0	0	8	0	0	0	0
C	March	1	0	8	0	0	0	1
D	April	1	1	29	0	0	0	1
E	***May***	***52***	***5***	***88***	***1***	***1***	***1***	***9***
F	June	6	6	51	0	0	1	3
G	July	2	2	25	0	0	1	4
H	August	4	1	10	0	0	1	1
I	September	1	1	10	0	0	0	1
J	October	6	1	28	0	1	1	1
K	November	10	1	19	0	0	1	1
L	December	4	2	8	0	0	2	7
M	Avg Annual Reduction of Catch (= E)	-52	-5	-88	-1	-1	-1	-9
N	Change in Catch During Hotspot Closure	10	9	6	0	0	2	2
O	Net Change with Redistribution (M+N)	-42	4	-82	-1	-1	1	-7
P	Avg Annual # Interactions in Hotspot (Sum A to L)	91	21	294	1	3	9	35
Q	Avg Annual Percent Change in Area ((O/P)*100)	-46.15%	19.05%	-27.89%	-100.00%	-33.33%	11.11%	-20.00%
R	Avg Annual # Interactions (∑(All PLL Interactions 2008-2014))/7	538	692	507	15	18	262	277
S	Percent Change in Fishery ((O/R)*100)	-7.81%	0.58%	-16.17%	-6.67%	-5.56%	0.38%	-2.53%

Table 4.4 Anticipated ecological impacts on prohibited HMS/bycatch as a result of the pelagic longline Charleston Bump hotspot closure (May). Source: HMS Logbook Data from 2008-2014.

	2008 - 2014 Average Annual Interactions	White Marlin Discards	Blue Marlin Discards	Sailfish Discards	Spearfish Discards	Leatherback Sea Turtle Interactions	Loggerhead Sea Turtle Interactions	Hammer-head Kept / Discard*	Silky Kept / Discard^	Oceanic Whitetip Kept / Discard*
A	January	2	3	3	1	1	1	2	19	1
B	February	0	0	0	0	0	0	0	2	0
C	March	0	1	0	0	1	0	0	1	0
D	April	1	1	1	1	1	0	2	17	0
E	***May***	***5***	***6***	***8***	***3***	***1***	***1***	***30***	***154***	***2***
F	June	3	4	4	2	0	0	14	21	2
G	July	2	6	2	0	0	0	10	10	2
H	August	1	3	4	0	1	0	3	10	1
I	September	1	3	1	0	0	0	1	7	1
J	October	1	2	2	0	0	1	5	18	2
K	November	2	3	4	1	1	1	15	21	3
L	December	2	2	3	0	1	0	5	12	2
M	Avg Annual Reduction of Catch (-E)	-5	-6	-8	-3	-1	-1	-30	-154	-2
N	Change in Catch During Hotspot Closure	12	11	7	3	0	0	20	83	2
O	Net Change with Redistribution (M+N)	7	5	-1	0	-1	-1	-10	-71	0
P	Avg Annual # Interactions in Hotspot Closure (Sum A to L)	20	34	32	8	7	4	87	292	16
Q	Avg Annual Percent Change in Area ((O/P)*100)	35.00%	14.71%	-3.13%	0.00%	-14.29%	-25.00%	-11.49%	-24.32%	0.00%
R	Avg Annual # Interactions (∑(All PLL Interactions 2008-2014)	1,076	744	553	278	53	91	1,486	1,724	197
S	Percent Change in Fishery ((O/R)*100)	0.65%	0.67%	-0.18%	0.00%	-1.89%	-1.10%	-0.67%	-4.12%	0.00%

Table 4.5 Anticipated ecological impacts on HMS and non-HMS target species as a result of the Charleston Bump hotspot closure (May). Source: HMS Logbook Data from 2008-2014.

	2008 - 2014 Average Annual Interactions	Hooks	SWO Kept	SWO Discard	BFT Kept	BFT Discard	YFT Kept	YFT Discard	BET Kept	BET Discard	Dolphin Kept	Dolphin Discard	Wahoo Kept	Wahoo Discard
A	January	20,905	343	94	1	0	3	1	0	0	30	1	5	0
B	February	215	12	6	0	0	0	0	0	0	1	0	0	0
C	March	358	13	6	0	0	0	0	0	0	1	0	0	0
D	April	3,918	90	12	0	0	1	0	0	0	93	0	1	0
E	***May***	***107,317***	***834***	***94***	***2***	***0***	***26***	***0***	***1***	***0***	***8,165***	***47***	***37***	***1***
F	June	35,725	601	103	3	1	8	0	1	1	428	1	20	0
G	July	21,426	571	101	0	1	3	0	3	2	41	1	16	1
H	August	15,282	486	87	1	0	2	0	6	0	14	1	7	0
I	September	15,689	580	171	0	0	6	0	15	0	15	1	4	0
J	October	25,562	811	214	0	0	22	5	1	1	31	1	5	1
K	November	43,241	1,072	285	0	0	18	3	4	1	68	1	11	1
L	December	30,404	688	176	0	0	19	1	2	0	48	1	9	1
M	Avg Annual Reduction of Catch (= E)	-107,317	-834	-94	-2	0	-26	0	-1	0	-8,165	-47	-37	-1
N	Change in Catch During Hotspot Closure	67,684	315	55	6	3	88	31	84	2	3,819	8	17	0
O	Net Change with Redistribution (M+N)	-39,633	-519	-39	4	3	62	31	83	2	-4,346	-39	-20	-1
P	Avg Annual # Interactions / Hooks (Sum A to L)	320,042	6,101	1,349	7	2	108	10	33	5	8,935	55	115	5
Q	Avg Annual Percent Change in Area ((O/P)*100)	-12.38%	-8.51%	-2.89%	57.14 %	150.00%	57.41%	310.00%	251.52%	40.00%	-48.64%	-70.91%	-17.39%	-20.00%
R	Avg Annual # Interactions (∑(All PLL Interactions 2008-2014)	6,764,456	41,389	7,277	394	882	41,457	1,076	13,993	445	43,805	312	2,424	68
S	Percent Change in Fishery ((O/R)*100)	-0.59%	-1.25%	-0.54%	1.02%	0.34%	0.15%	2.88%	0.59%	0.45%	-9.92%	-12.50%	-0.83%	-1.47%

Table 4.6 Anticipated ecological impacts on select large coastal sharks as a result of the Charleston Bump hotspot closure (May). Source: HMS Logbook Data from 2008-2014.

	2008 - 2014 Average Annual Interactions	Blacktip Kept	Blacktip Discarded	Spinner Kept	Spinner Discarded	Tiger Kept	Tiger Discarded
A	January	0	1	0	0	0	23
B	February	0	0	0	0	0	1
C	March	0	0	0	0	0	1
D	April	0	1	1	1	0	2
E	***May***	***0***	***4***	***0***	***0***	***1***	***43***
F	June	0	1	0	1	1	14
G	July	0	0	0	1	0	12
H	August	0	0	0	0	1	12
I	September	0	0	0	0	0	7
J	October	0	0	0	1	1	10
K	November	0	2	0	0	0	17
L	December	0	2	0	1	0	20
M	Average Annual Reduction of Catch (= E)	0	-4	0	0	-1	-43
N	Change in Catch During Hotspot Closure	0	0	0	1	0	31
O	Net Change with Redistribution (M+N)	0	-4	0	1	-1	-12
P	Average Annual # Interactions (or Hooks) in Hotspot Closure (Sum A to L)	0	11	1	5	4	162
Q	Average Annual Percent Change in Area ((O/P)*100)	0.00%	-36.36%	0.00%	20.00%	-25.00%	-7.41%
R	Average Annual # Interactions (∑(All PLL Interactions 2008-2014)	8	121	23	107	29	1854
S	Percent Change in Fishery ((O/R)*100)	0.00%	-3.31%	0.00%	0.93%	-3.45%	-0.65%

Table 4.7 Anticipated ecological impacts on select pelagic sharks as a result of the Charleston Bump hotspot closure (May). Source: HMS Logbook Data from 2008-2014.

	2008 - 2014 Average Annual Interactions	Blue Kept	Blue Discard	Shortfin Mako Kept	Shortfin Mako Discard	Porbeagle Kept	Porbeagle Discard	Common Thresher Kept	Common Thresher Discard
A	January	0	7	5	1	0	0	1	5
B	February	0	0	1	0	0	0	0	0
C	March	0	1	1	0	0	0	0	0
D	April	0	5	1	1	0	0	0	0
E	***May***	***1***	***39***	***7***	***2***	***0***	***0***	***1***	***6***
F	June	1	10	3	1	0	0	0	1
G	July	0	2	3	1	0	0	0	0
H	August	0	3	2	1	0	0	0	0
I	September	0	3	1	1	0	0	0	0
J	October	0	2	3	1	0	0	0	1
K	November	2	7	5	1	0	0	0	1
L	December	0	7	4	2	0	0	0	1
M	Avg Annual Reduction of Catch (= E)	-1	-39	-7	-2	0	0	-1	-6
N	Change in Catch During Hotspot Closure	7	235	13	3	0	0	0	1
O	Net Change with Redistribution (M+N)	6	196	6	1	0	0	-1	-5
P	Total Avg Annual # Interactions (or Hooks) in Hotspot (Sum A to L)	4	86	36	12	0	0	2	15
Q	Avg Annual Percent Change in Area ((O/P)*100)	150.00%	227.91%	16.67%	8.33%	0.00%	0.00%	-50.00%	-33.33%
R	Avg Annual # Interactions (∑(All PLL Interactions 2008-2014)	386	32,815	2,919	795	5	185	92	110
S	Percent Change in Fishery ((O/R)*100)	1.55%	0.60%	0.21%	0.13%	0.00%	0.00%	-1.09%	-4.55%

Alternative B4a Conclusion
Alternative B4a would reduce dusky shark interactions by 7.81 percent annually (reducing interactions with approximately 42 dusky sharks per year) in the pelagic longline fishery, resulting in minor, beneficial ecological impacts for dusky sharks. This alternative could also result in notable reductions in the numbers of dolphin and swordfish retained by the pelagic longline fleet and a notable localized reduction in effort (a loss of nearly 40,000 hooks set per year), implying minor to moderate beneficial ecological impacts for some target and non-target species. However, it may also result in adverse ecological impacts: redistribution models suggest a potential increase in the number of bluefin tuna interactions through redistribution of effort to adjacent areas with higher bluefin tuna catch-per-unit-effort. Due to the minor reductions in dusky shark interactions that could be expected as a result of this alternative, and the fact that the pelagic longline fishery is only responsible for a comparatively small, but uncertain fraction of total dusky shark fishing mortality, this alternative is not preferred at this time.

Alternative B4b: Prohibit the use of pelagic longline gear in HMS fisheries in the vicinity of the Cape Hatteras Special Research/Hatteras Shelf Area during the month of May ("Hatteras Shelf Hotspot May") (Figure 4.4).

Closure of the Hatteras Shelf hotspot in May (Alternative B4b) would result in short- and long-term direct, minor beneficial ecological impacts on dusky shark populations. The direct ecological impacts on 23 HMS and non HMS-target species, prohibited species, and other bycatch depends on the species and whether interactions increase or decrease after redistribution of fishing effort from the closed to adjacent open areas in the Mid-Atlantic and South Atlantic Bights. Anticipated ecological impacts include consideration of effects in the buffer region that is located south and east of the hotspot closure; data from the buffer region is included in the estimation of ecological impacts since fishermen would likely also avoid these areas due to the risk of drifting into the hotspot closure.

Table 4.8 through Table 4.12 describe the impacts of the closure for individual species. Most of these direct impacts are anticipated to be minor in nature (beneficial or adverse depending on whether or not kept catch and discards decrease or increase) as most changes are less than 10 percent (fishery-wide). Given the minor direct impacts on most species, the indirect impacts of alternative B4b on ecosystem function and predator/prey relationships are anticipated to be neutral in the short- and long-term.

This alternative may have locally minor, beneficial impacts on target and bycatch species through an effort reduction of 9.18 percent (-53,264 hooks/year) after redistribution of effort, however the anticipated fishery-wide reduction in hooks set as a result of this closure is expected to be less than 1 percent (i.e., negligible impacts on target and bycatch species overall) (Table 4.10).

Based on the redistribution of effort model, NMFS anticipates that dusky shark interactions could be reduced by 3 sharks/year (- 0.56 percent, fishery-wide), and sandbar shark discards could decrease by 39 sharks/year (-5.64 percent) fishery-wide (Table 4.8), with the implementation of this hotspot. Localized reductions in sandbar shark discards are notable (i.e., -22.55 percent). After redistribution of effort from the closed area to the open areas of the Charleston Bump, the number of bluefin tuna kept and discarded could decrease by 4 and 5 fish/year, respectively, implying localized minor beneficial direct ecological effects and negligible fishery-wide direct ecological effects (Table 4.10).

Direct and indirect, minor, beneficial, ecological impacts for prohibited pelagic longline species and protected resources are expected in the short- and long-term (Table 4.9). Interactions with loggerhead and leatherback sea turtles could be reduced by 1 animal/year each. Expected reductions of prohibited billfish interactions are less than 1 percent, fishery-wide, as a result of this alternative. Direct localized ecological effects on hammerhead sharks are expected to be moderate and beneficial (-24.11 percent), but fishery-wide direct ecological effects are expected to be minor and beneficial (-8.68 percent), due to a reduction in hammerhead shark interactions by 129 sharks/year after redistribution of effort. Direct ecological impacts on silky and oceanic whitetip sharks after redistribution are expected to be minor and adverse (+2 sharks/year, +0.12 percent) and neutral (0 sharks/year), respectively.

Vessels fishing during this time in the proposed closure are targeting swordfish, yellowfin tuna, bigeye tuna, dolphin, and wahoo (Table 4.10). Localized impacts swordfish and the tunas are expected to be minor and beneficial (less than a 10 percent reduction in the numbers kept and discarded); however, localized ecological impacts on dolphin (-35.28 percent and -10 percent change in dolphin kept and discarded, respectively) and wahoo (-12.31 percent reduction in numbers retained) are moderate and beneficial. Fishery-wide ecological impacts on most pelagic longline target species are expected to be minor and beneficial (less than a 2 percent reduction in the numbers retained or discarded). Minor reductions in the number of dolphin retained fishery-wide may occur (-2,385 fish/year, -5.44 percent) as a result of this alternative, resulting in minor, beneficial ecological impacts for dolphin.

Direct ecological effects on select large coastal and pelagic sharks are shown in Table 4.11 and Table 4.12. Localized minor to moderate beneficial ecological effects are anticipated as a result

of this closure for blacktip shark (reduction in discards of 1 sharks/year, or -14.29 percent), spinner shark (reduction in discards of 7 sharks/year, or -16.28 percent), tiger shark (reduction in discards of 29 sharks/year, or -20.42 percent), and shortfin mako (localized reduction in number retained by 126 sharks/year, or -13.03 percent). This alternative is anticipated to have minor beneficial ecological effects, fishery-wide, on most shark species analyzed (i.e., less than a 2 percent reduction). However, this alternative could have minor beneficial direct ecological effects, fishery-wide, through reductions in the number of common thresher shark retained (-8 sharks/year, -8.70 percent), the number of shortfin mako retained (-126 sharks/year, -4.32 percent), the number of spinner sharks retained (-1 sharks/year, -4.35 percent) and discarded (-7 sharks/year, -6.54 percent), and in the number of tiger sharks retained (-1 shark/year, -3.45 percent) and discarded (-29 sharks/year, -1.56 percent).

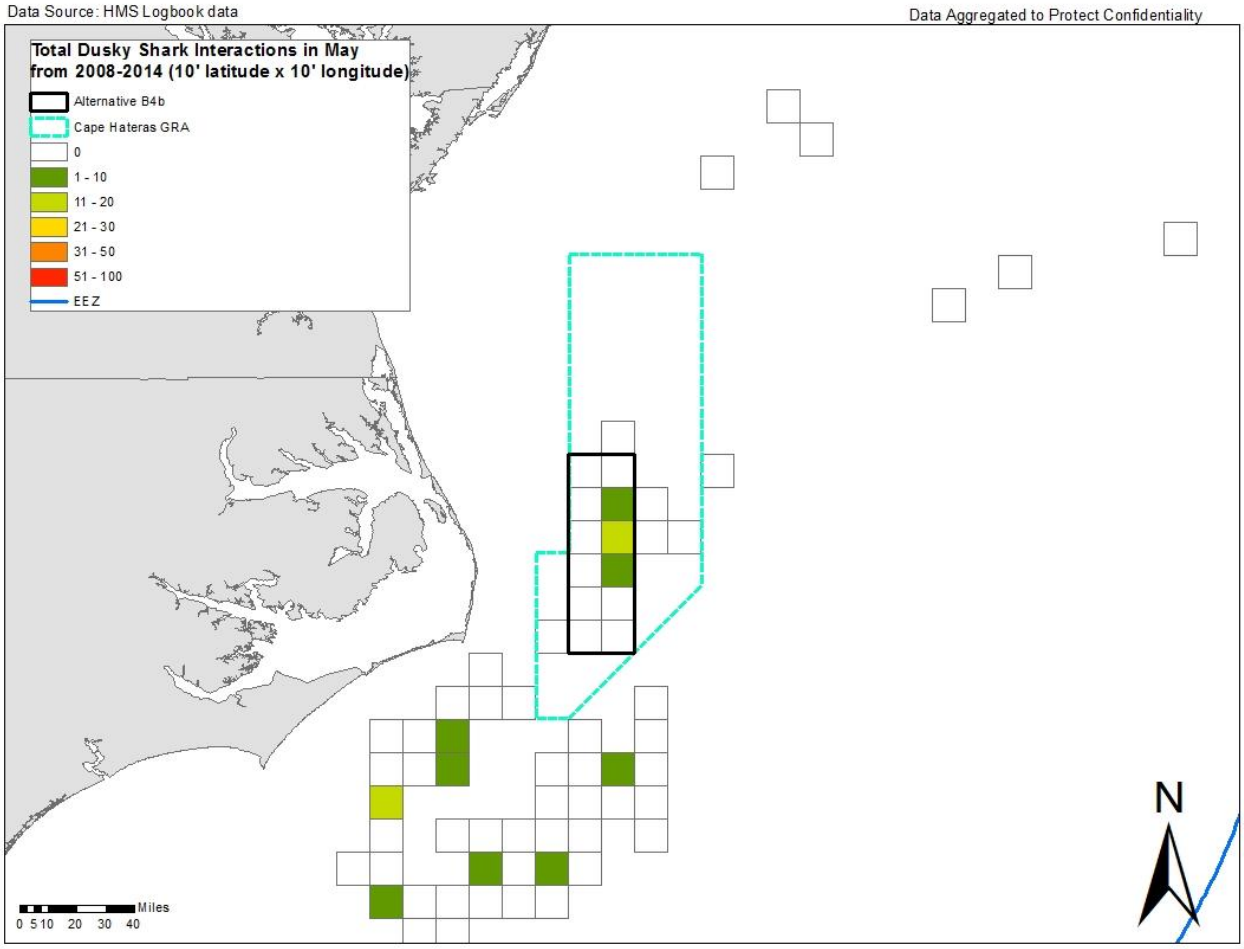

Figure 4.4 Map of total dusky shark interactions occurring in Hatteras Shelf Hotspot Closure during the month of May and aggregated in 10' X 10' grid cells. Source: HMS Logbook Data from 2008-2014.

Table 4.8 Anticipated ecological impacts on prohibited sharks/bycatch as a result of the Hatteras Shelf hotspot closure (May). Source: HMS Logbook Data from 2008-2014

	2008 - 2014 Average Annual Interactions	Dusky Discards	Sandbar Discards	Night Discards	Bignose Discards	White Discards	Longfin Mako Discards	Bigeye Thresher Discards
A	January	1	9	1	0	0	3	19
B	February	0	2	6	0	0	2	10
C	March	1	9	1	0	0	2	1
D	April	2	11	5	0	1	2	2
E	***May***	***8***	***41***	***11***	***0***	***1***	***1***	***4***
F	June	63	32	5	0	3	1	4
G	July	5	12	1	0	0	1	4
H	August	5	3	2	0	0	1	3
I	September	3	1	2	0	0	1	2
J	October	4	8	1	0	0	2	2
K	November	14	29	0	0	0	1	3
L	December	0	16	2	0	0	1	5
M	Average Annual Reduction of Catch	-8	-41	-11	0	-1	-1	-4
N	Change in Catch During Hotspot Closure	5	2	13	0	0	1	1
O	Net Change with Redistribution (M+N)	-3	-39	2	0	-1	0	-3
P	Total Avg Annual # Interactions in Hotspot Closure (Sum A to L)	106	173	37	0	5	18	59
Q	Avg Annual Percent Change in Area ((O/P)*100)	-2.84%	-22.55%	5.41%	0.00%	-20.00%	0.00%	-5.09%
R	Avg Annual # Interactions (∑(All PLL Interactions 2008-2014)	538	692	507	15	18	262	277
S	Percent Change in Fishery ((O/R)*100)	-0.56%	-5.64%	0.40%	0.00%	-5.56%	0.00%	-1.09%

Table 4.9 Anticipated ecological impacts on prohibited HMS/bycatch as a result of the pelagic longline Hatteras Shelf hotspot closure (May). Source: HMS Logbook Data from 2008-2014.

	2008 - 2014 Average Annual Interactions	White Marlin Discards	Blue Marlin Discards	Sailfish Discards	Spearfish Discards	Leatherback Sea Turtles	Loggerhead Sea Turtles	Hammer-head Kept / Discards*	Silky Kept / Discards^	Oceanic Whitetip Kept / Discards*
A	January	1	1	0	0	1	0	33	5	0
B	February	2	1	1	1	1	1	38	4	2
C	March	3	2	1	1	1	0	5	7	5
D	April	8	4	1	2	0	1	31	14	2
E	***May***	***4***	***3***	***1***	***1***	***1***	***1***	***137***	***8***	***1***
F	June	8	1	2	1	0	1	78	13	2
G	July	6	3	3	1	0	0	98	4	1
H	August	4	1	2	0	0	0	19	2	0
I	September	1	2	1	1	1	0	15	1	1
J	October	2	1	1	0	0	0	20	4	1
K	November	1	0	1	1	0	0	27	2	1
L	December	0	1	0	2	0	0	34	4	0
M	Avg Annual Reduction of Catch	-4	-3	-1	-1	-1	-1	-137	-8	-1
N	Change in Catch During Hotspot Closure	2	1	1	1	0	0	8	10	1
O	Net Change with Redistribution (M+N)	-2	-2	0	0	-1	-1	-129	2	0
P	Total Average Annual # Interactions in Hotspot (Sum A to L)	40	20	14	11	5	4	535	68	16
Q	Avg Annual Percent Change in Area ((O/P)*100)	-5.00%	-10.00%	0.00%	0.00%	-20.00%	-25.00%	-24.11%	2.94%	0.00%
R	Avg Annual # Interactions (∑(All PLL Interactions 2008-2014)	1076	744	553	278	91	53	1,486	1,724	197
S	Percent Change in Fishery ((O/R)*100)	-0.19%	-0.27%	0.00%	0.00%	-1.10%	-1.89%	-8.68%	0.12%	0.00%

*ICCAT Fisheries, including HMS Pelagic Longline, are prohibited from retaining, transshipping, or landing Hammerhead or Oceanic Whitetip Sharks (76 FR 53652; August 29, 2011), per ICCAT recommendations 10-07 and 10-08.

^ICCAT Fisheries, including HMS Pelagic Longline, are prohibited from retaining, transshipping, or landing Silky Sharks (77 FR 60632; October 4, 2012), per ICCAT recommendation 11-08.

Table 4.10 Anticipated ecological impacts on HMS and non-HMS target species as a result of the Hatteras Shelf hotspot closure (May). Source: HMS Logbook Data from 2008-2014.

	2008 - 2014 Average Annual Interactions	Hooks	SWO Kept	SWO Discards	BFT Kept	BFT Discards	YFT Kept	YFT Discards	BET Kept	BET Discards	Dolphin Kept	Dolphin Discards	Wahoo Kept	Wahoo Discards
A	January	33,745	314	58	6	36	139	2	28	0	7	0	3	0
B	February	37,643	306	27	9	75	252	2	13	1	9	0	4	0
C	March	58,458	469	23	7	56	354	3	11	1	50	0	4	0
D	April	86,458	716	30	4	54	220	2	11	2	182	0	1	0
E	***May***	***82,997***	***354***	***23***	***6***	***6***	***457***	***1***	***54***	***1***	***4,175***	***3***	***12***	***0***
F	June	64,552	133	21	7	2	1,010	11	81	1	2,104	5	7	1
G	July	51,394	70	11	0	0	1,343	21	217	2	146	1	11	0
H	August	42,149	45	6	2	0	962	8	215	1	41	0	8	0
I	September	40,809	49	10	1	0	927	15	366	4	19	1	7	0
J	October	35,013	68	19	0	0	725	11	234	3	11	0	4	0
K	November	24,191	161	38	1	1	376	3	77	1	6	0	3	0
L	December	22,718	269	58	2	2	65	1	36	0	10	0	1	0
M	Avg Annual Reduction of Catch	-82,997	-354	-23	-6	-6	-457	-1	-54	-1	-4,175	-3	-12	0
N	Change in Catch During Hotspot Closure	29,733	204	26	2	1	51	1	5	0	1,790	2	4	0
O	Net Change with Redistribution (M+N)	-53,264	-150	3	-4	-5	-406	0	-49	-1	-2,385	-1	-8	0
P	Avg Annual # Interactions (or Hooks) in Hotspot (Sum A to L)	580,127	2,954	324	45	232	6,830	80	1,343	17	6,760	10	65	1
Q	Avg Annual Percent Change in Area ((O/P)*100)	-9.18%	-5.08%	0.93%	-8.89%	-2.16%	-5.94%	0.00%	-3.65%	-5.88%	-35.28%	-10.00%	-12.31%	0.00%
R	Average Annual # Interactions (∑(All PLL Interactions 2008-2014)	6,764,456	41,389	7,277	394	882	41,457	1,076	13,993	445	43,805	312	2,424	68
S	Percent Change in Fishery ((O/R)*100)	-0.79%	-0.36%	0.04%	-1.02%	-0.57%	-0.98%	0.00%	-0.35%	-0.22%	-5.44%	-0.32%	-0.33%	0.00%

Table 4.11 Anticipated ecological impacts on select large coastal sharks as a result of the Hatteras Shelf hotspot closure (May). Source: HMS Logbook Data from 2008-2014.

	2008 - 2014 Average Annual Interactions	Blacktip Kept	Blacktip Discards	Spinner Kept	Spinner Discards	Tiger Kept	Tiger Discards
A	January	0	1	0	0	0	4
B	February	0	0	0	2	0	5
C	March	0	1	1	3	1	20
D	April	0	1	1	2	3	42
E	**May**	0	2	1	7	1	40
F	June	0	0	12	23	0	17
G	July	0	1	2	1	1	3
H	August	0	0	0	1	0	1
I	September	0	1	1	1	0	2
J	October	0	0	0	1	0	2
K	November	0	0	0	1	1	3
L	December	0	0	0	1	0	3
M	Avg Annual Reduction of Catch	0	-2	-1	-7	-1	-40
N	Change in Catch During Hotspot Closure	0	1	0	0	0	11
O	Net Change with Redistribution (M+N)	0	-1	-1	-7	-1	-29
P	Avg Annual # Interactions (or Hooks) in Hotspot (Sum A to L)	0	7	18	43	7	142
Q	Avg Annual Percent Change in Area ((O/P)*100)	0.00%	-14.29%	-5.56%	-16.28%	-14.29%	-20.42%
R	Average Annual # Interactions (∑(All PLL Interactions 2008-2014)	8	121	23	107	29	1,854
S	Percent Change in Fishery ((O/R)*100)	0.00%	-0.83%	-4.35%	-6.54%	-3.45%	-1.56%

Table 4.12 Anticipated ecological impacts on select pelagic sharks as a result of the Hatteras Shelf hotspot closure (May). Source: HMS Logbook Data from 2008-2014.

	2008 - 2014 Average Annual Interactions	Blue Kept	Blue Discards	Shortfin Mako Kept	Shortfin Mako Discards	Porbeagle Kept	Porbeagle Discards	Common Thresher Kept	Common Thresher Discards
A	January	10	53	123	23	0	0	7	7
B	February	15	91	190	5	0	1	16	8
C	March	17	94	85	2	0	0	11	1
D	April	41	155	242	2	0	0	26	2
E	***May***	***4***	***92***	***140***	***3***	***0***	***0***	***8***	***2***
F	June	3	27	22	2	0	0	1	1
G	July	1	11	9	1	0	0	0	1
H	August	0	3	9	0	0	0	1	1
I	September	0	2	10	1	0	0	0	1
J	October	0	5	13	1	0	0	1	1
K	November	4	27	68	3	0	0	1	1
L	December	15	41	56	7	0	0	4	2
M	Avg Annual Reduction of Catch	-4	-92	-140	-3	0	0	-8	-2
N	Change in Catch During Hotspot Closure	1	55	14	1	0	0	0	0
O	Net Change with Redistribution (M+N)	-3	-37	-126	-2	0	0	-8	-2
P	Avg Annual # Interactions (or Hooks) in Hotspot (Sum A to L)	110	601	967	50	0	1	76	28
Q	Avg Annual Percent Change in Area ((O/P)*100)	-2.73%	-6.16%	-13.03%	-4.00%	0.00%	0.00%	-10.53%	-7.14%
R	Average Annual # Interactions (∑(All PLL Interactions 2008-2014)	386	32,815	2,919	795	5	185	92	110
S	Percent Change in Fishery ((O/R)*100)	-0.78%	-0.11%	-4.32%	-0.25%	0.00%	0.00%	-8.70%	-1.82%

Alternative B4b Conclusion
This area was identified as a "hotspot" in the draft Amendment 5 analysis because 13 of the 14 Dusky Shark interactions between 2008 and 2010 in the Mid-Atlantic Bight occurred within the boundaries of the hotspot closure. However, incorporation of new data (2008 – 2014) and new analysis methodology suggested minimal average annual reductions in dusky shark interactions before (-8 sharks) and after redistribution (-3 sharks), with small localized and fishery-wide effects on dusky shark populations. Therefore, this alternative would likely not contribute substantially to the overall goal of reducing dusky shark interactions and is not a preferred alternative at this time.

Alternative B4c: Prohibit the use of pelagic longline gear in HMS fisheries in the vicinity of the Cape Hatteras Special Research/Hatteras Shelf Area during the month of June ("Hatteras Shelf Hotspot June")(Figure 4.5).

Closure of the Hatteras Shelf hotspot in June (Alternative B4c) would result in short- and long-term direct, minor, beneficial ecological impacts on the dusky shark populations. The direct ecological impacts on 23 HMS and non HMS-target species, prohibited species, and other bycatch depends on the species and whether interactions increase or decrease after redistribution of fishing effort from the closed to adjacent open areas in the Mid-Atlantic and South Atlantic Bights. Anticipated ecological impacts include consideration of the buffer region that is located south and east of the hotspot closure; data from the buffer region is included in the estimation of ecological impacts since fishermen would likely also avoid these areas due to the risk of drifting into the hotspot closure. Table 4.13 through Table 4.17 describe the impacts of the closure for individual species. Most of these direct impacts are anticipated to be minor in nature (beneficial or adverse depending on whether or not kept catch and discards decrease or increase) as most changes are less than 10 percent (fishery-wide). Given the minor direct impacts on most species, the indirect impacts of alternative B4a on ecosystem function and predator/prey relationships are anticipated to be neutral in the short- and long-term.

This alternative may have locally minor, beneficial impacts on target and bycatch species through an effort reduction of 5.89 percent (-34,159 hooks/year) after redistribution of effort. However, the anticipated fishery-wide reduction in hooks set as a result of this closure is expected to be less than 1 percent (i.e., negligible impacts on target and bycatch species overall) (Table 4.15).

Based on the redistribution of effort model, NMFS anticipates that dusky shark interactions could be reduced by 48 sharks/year (- 8.93 percent, fishery-wide), and sandbar shark discards could decrease by 29 sharks/year (-4.20 percent) fishery-wide (Table 4.13), with the implementation of this hotspot closure. Localized reductions in dusky (-45.29 percent) and sandbar (-16.77 percent) shark discards are notable. After redistribution of effort from the closed area to adjacent open areas in the Mid- and South-Atlantic Bight, the number of bluefin tuna kept and discarded could decrease by 3 fish/year and increase by 6 fish/year, respectively, implying mixed, minor localized direct effects and negligible (< 1 percent change) fishery-wide direct effects (Table 4.14).

Direct and indirect, minor, beneficial ecological impacts for prohibited pelagic longline species and protected resources are expected in the short- and long-term (Table 4.14). Interactions with loggerhead sea turtles could be reduced by 1 animal/year. This hotspot closure is anticipated to have neutral effects on leatherback sea turtles. Localized direct ecological effects on prohibited billfish could be minor and beneficial due to a reduction in discards of 7 to 10 percent for white marlin (-4 fish/year), sailfish (-1 fish/year), and roundscale spearfish (-1 fish/year). Expected reductions of prohibited billfish interactions are less than 1 percent, fishery-wide, as a result of this alternative. Direct localized ecological effects on hammerhead sharks are expected to be moderate and beneficial (-25.00 percent), but fishery-wide direct ecological effects are expected to be minor and beneficial (-4.71 percent), due to a reduction in hammerhead shark interactions by 70 sharks/year after redistribution of effort. Direct ecological impacts on silky (-7 sharks/year, -0.41 percent) and oceanic whitetip sharks (-1 shark/year, -0.51 percent) after redistribution, fishery-wide, are expected to be minor and beneficial.

Vessels fishing during this time in the hotspot closure are targeting swordfish, yellowfin tuna, bigeye tuna, dolphin, and wahoo (Table 4.15). Localized impacts on swordfish and bigeye tunas are expected to be minor and beneficial (less than a 10 percent reduction in the numbers kept and discarded); however, localized ecological impacts on yellowfin tuna (-781 fish/year, -11.43 percent) and dolphin retained (-1,611 fish/year, -23.83 percent) and discarded (-5 fish/year, -50 percent) could be minor to moderate and beneficial. Fishery-wide ecological impacts on most pelagic longline target species are expected to be minor and beneficial (less than a 2 percent reduction in the numbers retained or discarded). Minor reductions in the number of dolphin retained fishery-wide may occur (-1,611 fish/year, -3.68 percent) as a result of this hotspot closure, resulting in minor, beneficial ecological impacts for dolphin.

Direct ecological effects on select large coastal and pelagic sharks are shown in Table 4.16 and Table 4.17. Localized moderate beneficial ecological impacts are anticipated as a result of this closure for spinner shark due to the reduction in the number of sharks retained (-12 sharks/year, -66.67 percent) and discarded (-23 sharks/year, -53.49 percent) and for tiger shark (reduction in discards by 13 sharks/year, or -9.15 percent). This hotspot closure alternative is anticipated to have moderate to major beneficial ecological effects, fishery-wide, for spinner shark due to fishery wide reductions in the numbers retained and discarded by -52.17 percent and -21.50 percent, respectively. Ecological benefits for other select large coastal and pelagic sharks are minor and beneficial, with most reductions in the numbers retained or discarded amounting to a fishery-wide reduction of less than 2 percent.

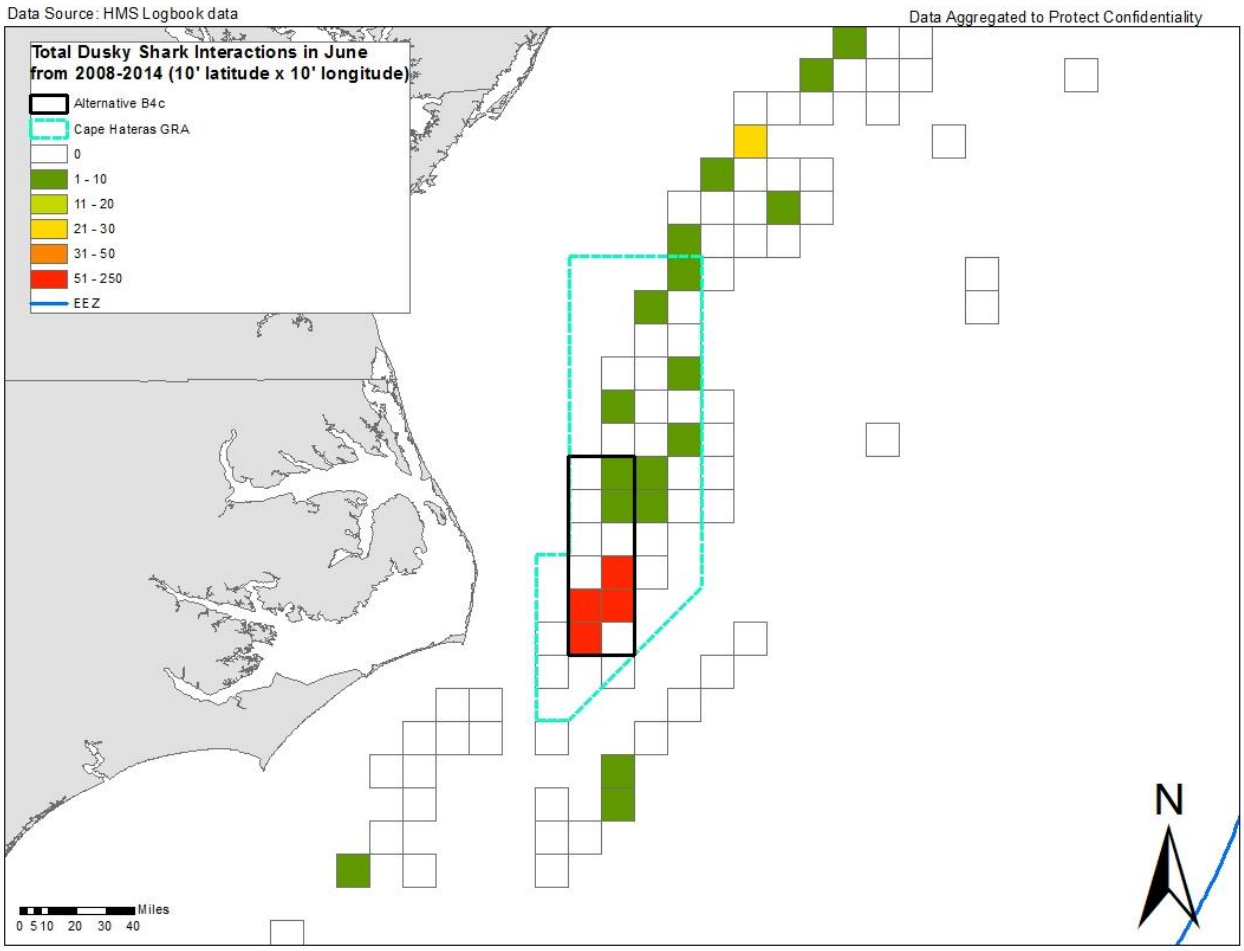

Figure 4.5 Map of total dusky shark interactions occurring in Hatteras Shelf Hotspot Closure during the month of June and aggregated in 10' X 10' grid cells. Source: HMS Logbook Data from 2008-2014.

Table 4.13 Anticipated ecological impacts on prohibited sharks as a result of the pelagic longline Hatteras Shelf hotspot closure (June). Source: HMS Logbook Data from 2008-2014.

	2008 - 2014 Average Annual Interactions	Dusky Discards	Sandbar Discards	Night Discards	Bignose Discards	White Discards	Longfin Mako Discards	Bigeye Thresher Discards
A	January	1	9	1	0	0	3	19
B	February	0	2	6	0	0	2	10
C	March	1	9	1	0	0	2	1
D	April	2	11	5	0	1	2	2
E	May	8	41	11	0	1	1	4
F	***June***	***63***	***32***	***5***	***0***	***3***	***1***	***4***
G	July	5	12	1	0	0	1	4
H	August	5	3	2	0	0	1	3
I	September	3	1	2	0	0	1	2
J	October	4	8	1	0	0	2	2
K	November	14	29	0	0	0	1	3
L	December	0	16	2	0	0	1	5
M	Avg Annual Reduction of Catch	-63	-32	-5	0	-3	-1	-4
N	Change in Catch During Hotspot Closure	15	3	5	0	0	0	1
O	Net Change with Redistribution (M+N)	-48	-29	0	0	-3	-1	-3
P	Avg Annual # Interactions in Hotspot (Sum A to L)	106	173	37	0	5	18	59
Q	Avg Annual Percent Change in Area ((O/P)*100)	-45.29%	-16.77%	0.00%	0.00%	-60.00%	-5.56%	-5.09%
R	Average Annual # Interactions (∑(All PLL Interactions 2008-2014)	538	692	507	15	18	262	277
S	Percent Change in Fishery ((O/R)*100)	-8.93%	-4.20%	0.00%	0.00%	-16.67%	-0.39%	-1.09%

Table 4.14 Anticipated ecological impacts on prohibited HMS/bycatch as a result of the pelagic longline Hatteras Shelf hotspot closure (June). Source: HMS Logbook Data from 2008-2014.

	2008 - 2014 Average Annual Interactions	White Marlin Discards	Blue Marlin Discards	Sailfish Discards	Spearfish Discards	Leatherback Sea Turtles	Loggerhead Sea Turtles	Hammer-head Kept / Discards*	Silky Kept / Discards^	Oceanic Whitetip Kept / Discards*
A	January	1	1	0	0	1	0	33	5	
B	February	2	1	1	1	1	1	38	4	2
C	March	3	2	1	1	1	0	5	7	5
D	April	8	4	1	2	0	1	31	14	2
E	May	4	3	1	1	1	1	137	8	1
F	***June***	***8***	***1***	***2***	***1***	***0***	***1***	***78***	***13***	***2***
G	July	6	3	3	1	0	0	98	4	1
H	August	4	1	2	0	0	0	19	2	0
I	September	1	2	1	1	1	0	15	1	1
J	October	2	1	1	0	0	0	20	4	1
K	November	1	0	1	1	0	0	27	2	1
L	December	0	1	0	2	0	0	34	4	0
M	Avg Annual Reduction of Catch	-8	-1	-2	-1	0	-1	-78	-13	-2
N	Change in Catch During Hotspot Closure	4	1	1	0	0	0	8	6	0
O	Net Change with Redistribution (M+N)	-4	0	-1	-1	0	-1	-70	-7	-2
P	Avg Annual # Interactions (or Hooks) in Hotspot (Sum A to L)	40	20	14	11	5	4	535	68	16
Q	Avg Annual Percent Change in Area ((O/P)*100)	-10.00%	0.00%	-7.14%	-9.09%	0.00%	-25.00%	-13.08%	-10.29%	-12.50%
R	Average Annual # Interactions (∑(All PLL Interactions 2008-2014)	1076	744	553	278	91	53	1,486	1,724	197
S	Percent Change in Fishery ((O/R)*100)	-0.37%	0.00%	-0.18%	-0.36%	0.00%	-1.89%	-4.71%	-0.41%	-1.02%

*ICCAT Fisheries, including HMS Pelagic Longline, are prohibited from retaining, transshipping, or landing Hammerhead or Oceanic Whitetip Sharks (76 FR 53652; August 29, 2011), per ICCAT recommendations 10-07 and 10-08.

^ICCAT Fisheries, including HMS Pelagic Longline, are prohibited from retaining, transshipping, or landing Silky Sharks (77 FR 60632; October 4, 2012), per ICCAT recommendation 11-08.

Table 4.15 Anticipated ecological impacts on HMS and non-HMS target species as a result of the Hatteras Shelf hotspot closure (June). Source: HMS Logbook Data from 2008-2014.

	2008 - 2014 Average Annual Interactions	Hooks	SWO Kept	SWO Discards	BFT Kept	BFT Discards	YFT Kept	YFT Discards	BET Kept	BET Discards	Dolphin Kept	Dolphin Discards	Wahoo Kept	Wahoo Discards
A	January	33,745	314	58	6	36	139	2	28	0	7	0	3	0
B	February	37,643	306	27	9	75	252	2	13	1	9	0	4	0
C	March	58,458	469	23	7	56	354	3	11	1	50	0	4	0
D	April	86,458	716	30	4	54	220	2	11	2	182	0	1	0
E	May	82,997	354	23	6	6	457	1	54	1	4,175	3	12	0
F	***June***	***64,552***	***133***	***21***	***7***	***2***	***1,010***	***11***	***81***	***1***	***2,104***	***5***	***7***	***1***
G	July	51,394	70	11	0	0	1,343	21	217	2	146	1	11	0
H	August	42,149	45	6	2	0	962	8	215	1	41	0	8	0
I	September	40,809	49	10	1	0	927	15	366	4	19	1	7	0
J	October	35,013	68	19	0	0	725	11	234	3	11	0	4	0
K	November	24,191	161	38	1	1	376	3	77	1	6	0	3	0
L	December	22,718	269	58	2	2	65	1	36	0	10	0	1	0
M	Avg Annual Reduction of Catch	-64,552	-133	-21	-7	-2	-1,010	-11	-81	-1	-2,104	-5	-7	-1
N	Change in Catch During Hotspot Closure	30,393	190	9	4	8	229	6	39	1	493	0	7	0
O	Net Change with Redistribution (M+N)	-34,159	57	-12	-3	6	-781	-5	-42	0	-1,611	-5	0	-1
P	Avg Annual # Interactions (or Hooks) in Hotspot (Sum A to L)	580,127	2,954	324	45	232	6,830	80	1,343	17	6,760	10	65	1
Q	Avg Annual Percent Change in Area ((O/P)*100)	-5.89%	1.93%	-3.70%	-6.67%	2.59%	-11.43%	-6.25%	-3.13%	0.00%	-23.83%	-50.00%	0.00%	0.00%
R	Average Annual # Interactions (∑(All PLL Interactions 2008-2014)	6,764,456	41,389	7,277	394	882	41,457	1,076	13,993	445	43,805	312	2,424	68
S	Percent Change in Fishery ((O/R)*100)	-0.50%	0.14%	-0.16%	-0.76%	0.68%	-1.88%	-0.46%	-0.30%	0.00%	-3.68%	-1.60%	0.00%	-1.47%

Table 4.16 Anticipated ecological impacts on select large coastal sharks as a result of the Hatteras Shelf hotspot closure (June). Source: HMS Logbook Data from 2008-2014.

	2008 - 2014 Average Annual Interactions	Blacktip Kept	Blacktip Discarded	Spinner Kept	Spinner Discarded	Tiger Kept	Tiger Discarded
A	January	0	1	0	0	0	4
B	February	0	0	0	2	0	5
C	March	0	1	1	3	1	20
D	April	0	1	1	2	3	42
E	May	0	2	1	7	1	40
F	***June***	0	0	12	23	0	17
G	July	0	1	2	1	1	3
H	August	0	0	0	1	0	1
I	September	0	1	1	1	0	2
J	October	0	0	0	1	0	2
K	November	0	0	0	1	1	3
L	December	0	0	0	1	0	3
M	Avg Annual Reduction of Catch	0	0	-12	-23	0	-17
N	Change in Catch During Hotspot Closure	0	0	0	0	0	4
O	Net Change with Redistribution (M+N)	0	0	-12	-23	0	-13
P	Avg Annual # Interactions (or Hooks) in Hotspot (Sum A to L)	0	7	18	43	7	142
Q	Avg Annual Percent Change in Area ((O/P)*100)	0.00%	0.00%	-66.67%	-53.49%	0.00%	-9.15%
R	Average Annual # Interactions (∑(All PLL Interactions 2008-2014)	8	121	23	107	29	1,854
S	Percent Change in Fishery ((O/R)*100)	0.00%	0.00%	-52.17%	-21.50%	0.00%	-0.70%

Table 4.17 Anticipated ecological impacts on select pelagic sharks as a result of the Hatteras Shelf hotspot closure (June). Source: HMS Logbook Data from 2008-2014.

	2008 - 2014 Average Annual Interactions	Blue Kept	Blue Discards	Shortfin Mako Kept	Shortfin Mako Discarded	Porbeagle Kept	Porbeagle Discards	Common Thresher Kept	Common Thresher Discards
A	January	10	53	123	23	0	0	7	7
B	February	15	91	190	5	0	1	16	8
C	March	17	94	85	2	0	0	11	1
D	April	41	155	242	2	0	0	26	2
E	May	4	92	140	3	0	0	8	2
F	***June***	***3***	***27***	***22***	***2***	***0***	***0***	***1***	***1***
G	July	1	11	9	1	0	0	0	1
H	August	0	3	9	0	0	0	1	1
I	September	0	2	10	1	0	0	0	1
J	October	0	5	13	1	0	0	1	1
K	November	4	27	68	3	0	0	1	1
L	December	15	41	56	7	0	0	4	2
M	Avg Annual Reduction of Catch	-3	-27	-22	-2	0	0	-1	-1
N	Change in Catch During Hotspot Closure	1	163	18	1	0	0	0	0
O	Net Change with Redistribution (M+N)	-2	136	-4	-1	0	0	-1	-1
P	Avg Annual # Interactions in Hotspot (Sum A to L)	110	601	967	50	0	1	76	28
Q	Avg Annual Percent Change in Area ((O/P)*100)	-1.82%	22.63%	-0.41%	-2.00%	0.00%	0.00%	-1.32%	-3.57%
R	Average Annual # Interactions (∑(All PLL Interactions 2008-2014)	386	32,815	2,919	795	5	185	92	110
S	Percent Change in Fishery ((O/R)*100)	-0.52%	0.41%	-0.14%	-0.13%	0.00%	0.00%	-1.09%	-0.91%

Alternative B4c Conclusion
The original analysis in draft Amendment 5 suggested that this hotspot could result in a reduction of dusky shark interactions, pelagic longline fishery-wide, of 12 percent (-48 sharks per year). After incorporating several new years of data and new methodology, the ecological gains were recalculated as a reduction in dusky shark interactions of almost 9 percent, in the pelagic longline fishery. Therefore, this alternative could have positive local ecological effects for the species, and might contribute towards the goal of reducing dusky shark interactions across the fishery. However, due to overall minimal reductions in dusky shark interactions, and the fact that the pelagic longline fishery only represents an uncertain fraction of total dusky shark fishing mortality, this alternative is not preferred.

Alternative B4d: Prohibit the use of pelagic longline gear in HMS fisheries in the vicinity of the Cape Hatteras Special Research/Hatteras Shelf Area during the month of November ("Hatteras Shelf Hotspot November")(Figure 4.6).

Closure of the Hatteras Shelf hotspot in November (Alternative B4d) would result in short- and long-term direct, minor, beneficial ecological impacts on dusky shark populations. The direct ecological impacts on 23 HMS and non HMS-target species, prohibited species, and other bycatch depends on the species and whether or not interactions increase or decrease after redistribution of fishing effort from the closed to adjacent open areas in the Mid-Atlantic and South Atlantic Bights. Anticipated ecological impacts include consideration of the buffer region that is located south and east of the hotspot closure; data from the buffer region is included in the estimation of ecological impacts since fishermen would likely also avoid these areas due to the risk of drifting into the hotspot closure. Table 4.18 through Table 4.22 describe the impacts of the closure for individual species. Most of these direct impacts are anticipated to be minor in nature (beneficial or adverse depending on whether or not kept catch and discards decrease or increase) as most changes are less than 10 percent (fishery-wide). Given the minor direct impacts on most species, the indirect impacts of alternative B4a on ecosystem function and predator/prey relationships are anticipated to be neutral in the short and long-term.
This alternative may have locally minor, beneficial impacts on target and bycatch species through an annual effort reduction of 2.32 percent (-13,450 hooks/year) after redistribution of effort, however, the anticipated fishery-wide reduction in hooks set as a result of this closure is expected to be less than 1 percent (i.e., negligible impacts on target and bycatch species overall) (Table 4.20).

Based on the redistribution of effort model, we anticipate that dusky shark interactions could be reduced by 14 sharks/year (- 2.61 percent, fishery-wide), and sandbar shark discards could decrease by 28 sharks/year (-4.05 percent) fishery-wide (Table 4.18), with the implementation of this hotspot. Localized reductions in dusky (-13.21 percent) and sandbar (-16.19 percent) shark discards could occur. After redistribution of effort from the closed area to adjacent open areas in the Mid- and South-Atlantic Bight, the number of bluefin tuna kept could decrease by 1 fish/year (and discards are expected to be negligible) implying minimal fishery-wide direct effects (Table 4.20).

Direct and indirect, minor, beneficial, ecological impacts for some prohibited pelagic longline species and protected resources are expected in the short- and long-term (Table 4.19). This

hotspot closure is anticipated to have neutral effects on leatherback and loggerhead sea turtles. Localized direct ecological effects on prohibited billfish could be minor and beneficial due to a reduction in discards of 7 to 10 percent for sailfish and roundscale spearfish (-1 fish/year each). Expected reductions of prohibited billfish interactions are less than 1 percent, fishery-wide, as a result of this alternative. Due to a reduction in hammerhead shark interactions by 24 sharks/year after redistribution of effort, direct ecological effects on hammerhead sharks are supposed to be minor and beneficial at localized (-4.49 percent) and fishery-wide (-1.62 percent) scales. Direct ecological impacts on silky and oceanic whitetip sharks after redistribution, fishery-wide, are expected to be minor and beneficial due to reductions in interactions by 1 fish/year (< 1 percent change).

Vessels fishing during this time in the closure are targeting swordfish, yellowfin tuna, bigeye tuna, dolphin, and wahoo (Table 4.20). Localized impacts on target species are expected to be minor and beneficial due to a small reduction (<10 percent) in the numbers of fish retained and discarded locally and fishery-wide.

Direct ecological effects on select large coastal and pelagic sharks are shown in Table 4.21 and Table 4.22. Localized and fishery-wide minor beneficial ecological impacts are anticipated as a result of this closure for select large coastal and pelagic shark species because reductions in the number retained and discarded is equivalent to less than a 5 percent change. The redistribution model predicted a potential increase in the number of blue sharks discarded, which may have been a result of redistribution of effort from the hotspot closure to adjacent areas that had higher catch-per-unit effort. The overall effect of this increase, however, is minimal when compared to total fishery-wide interactions (+46 sharks/year, +0.14 percent).

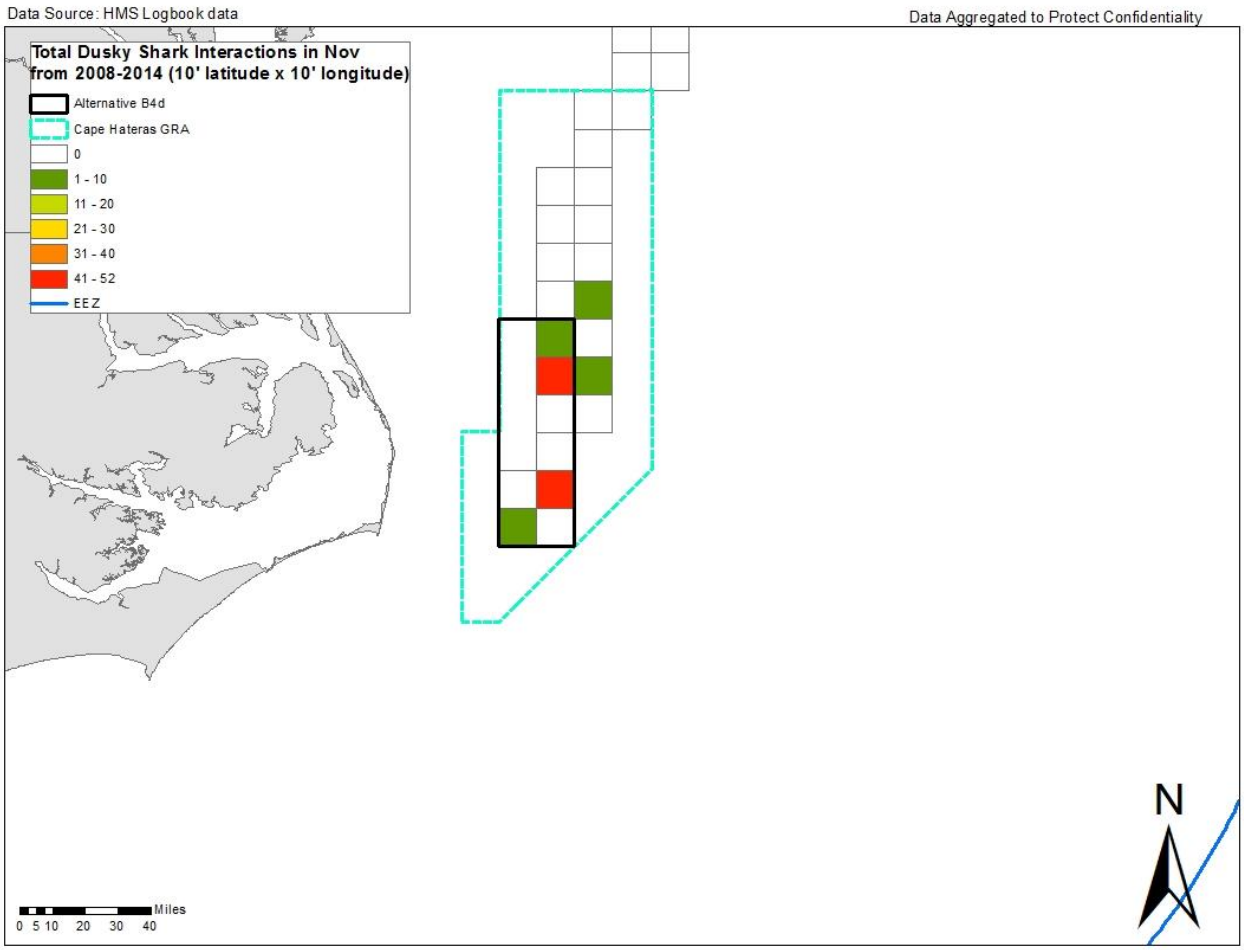

Figure 4.6 Map of total dusky shark interactions occurring in Hatteras Shelf Hotspot Closure during the month of November and aggregated in 10' X 10' grid cells. Source: HMS Logbook Data from 2008-2014.

Table 4.18 Anticipated ecological impacts on prohibited sharks/bycatch as a result of the pelagic longline Hatteras Shelf hotspot closure (Nov). Source: HMS Logbook Data from 2008-2014.

	2008 - 2014 Average Annual Interactions	Dusky Discards	Sandbar Discards	Night Discards	Bignose Discards	White Discards	Longfin Mako Discards	Bigeye Thresher Discards
A	January	1	9	1	0	0	3	19
B	February	0	2	6	0	0	2	10
C	March	1	9	1	0	0	2	1
D	April	2	11	5	0	1	2	2
E	May	8	41	11	0	1	1	4
F	June	63	32	5	0	3	1	4
G	July	5	12	1	0	0	1	4
H	August	5	3	2	0	0	1	3
I	September	3	1	2	0	0	1	2
J	October	4	8	1	0	0	2	2
K	***November***	***14***	***29***	***0***	***0***	***0***	***1***	***3***
L	December	0	16	2	0	0	1	5
M	Avg Annual Reduction of Catch	-14	-29	0	0	0	-1	-3
N	Change in Catch During Hotspot Closure	0	1	0	0	0	0	1
O	Net Change with Redistribution (M+N)	-14	-28	0	0	0	-1	-2
P	Avg Annual # Interactions in Hotspot (Sum A to L)	106	173	37	0	5	18	59
Q	Avg Annual Percent Change in Area ((O/P)*100)	-13.21%	-16.19%	0.00%	0.00%	0.00%	-5.56%	-3.39%
R	Average Annual # Interactions (∑(All PLL Interactions 2008-2014)	538	692	507	15	18	262	277
S	Percent Change in Fishery ((O/R)*100)	-2.61%	-4.05%	0.00%	0.00%	0.00%	-0.39%	-0.73%

Table 4.19 Anticipated ecological impacts on prohibited HMS/bycatch as a result of the pelagic longline Hatteras Shelf hotspot closure (Nov). Source: HMS Logbook Data from 2008-2014.

	2008 - 2014 Average Annual Interactions	White Marlin Discards	Blue Marlin Discards	Sailfish Discards	Spearfish Discards	Leatherback Sea Turtles	Loggerhead Sea Turtles	Hammer-head Kept / Discards*	Silky Kept / Discards^	Oceanic Whitetip Kept / Discards*
A	January	1	1	0	0	1	0	33	5	0
B	February	2	1	1	1	1	1	38	4	2
C	March	3	2	1	1	1	0	5	7	5
D	April	8	4	1	2	0	1	31	14	2
E	May	4	3	1	1	1	1	137	8	1
F	June	8	1	2	1	0	1	78	13	2
G	July	6	3	3	1	0	0	98	4	1
H	August	4	1	2	0	0	0	19	2	0
I	September	1	2	1	1	1	0	15	1	1
J	October	2	1	1	0	0	0	20	4	1
K	***November***	***1***	***0***	***1***	***1***	***0***	***0***	***27***	***2***	***1***
L	December	0	1	0	2	0	0	34	4	0
M	Avg Annual Reduction of Catch	-1	0	-1	-1	0	0	-27	-2	-1
N	Change in Catch During Hotspot Closure	0	0	0	0	0	0	3	1	0
O	Net Change with Redistribution (M+N)	-1	0	-1	-1	0	0	-24	-1	-1
P	Avg Annual # Interactions in Hotspot (Sum A to L)	40	20	14	11	5	4	535	68	16
Q	Avg Annual Percent Change in Area ((O/P)*100)	-2.50%	0.00%	-7.14%	-9.09%	0.00%	0.00%	-4.49%	-1.47%	-6.25%
R	Average Annual # Interactions (∑(All PLL Interactions 2008-2014)	1076	744	553	278	91	53	1,486	1,724	197
S	Percent Change in Fishery ((O/R)*100)	-0.09%	0.00%	-0.18%	-0.36%	0.00%	0.00%	-1.62%	-0.06%	-0.51%

*ICCAT Fisheries, including HMS Pelagic Longline, are prohibited from retaining, transshipping, or landing Hammerhead or Oceanic Whitetip Sharks (76 FR 53652; August 29, 2011), per ICCAT recommendations 10-07 and 10-08.

^ICCAT Fisheries, including HMS Pelagic Longline, are prohibited from retaining, transshipping, or landing Silky Sharks (77 FR 60632; October 4, 2012), per ICCAT recommendation 11-08.

Table 4.20 Anticipated ecological impacts on HMS and non-HMS target species as a result of the Hatteras Shelf hotspot closure (Nov). Source: HMS Logbook Data from 2008-2014.

	2008 - 2014 Average Annual Interactions	Hooks	SWO Kept	SWO Discards	BFT Kept	BFT Discards	YFT Kept	YFT Discards	BET Kept	BET Discards	Dolphin Kept	Dolphin Discards	Wahoo Kept	Wahoo Discards
A	January	33,745	314	58	6	36	139	2	28	0	7	0	3	0
B	February	37,643	306	27	9	75	252	2	13	1	9	0	4	0
C	March	58,458	469	23	7	56	354	3	11	1	50	0	4	0
D	April	86,458	716	30	4	54	220	2	11	2	182	0	1	0
E	May	82,997	354	23	6	6	457	1	54	1	4,175	3	12	0
F	June	64,552	133	21	7	2	1,010	11	81	1	2,104	5	7	1
G	July	51,394	70	11	0	0	1,343	21	217	2	146	1	11	0
H	August	42,149	45	6	2	0	962	8	215	1	41	0	8	0
I	September	40,809	49	10	1	0	927	15	366	4	19	1	7	0
J	October	35,013	68	19	0	0	725	11	234	3	11	0	4	0
K	***November***	***24,191***	***161***	***38***	***1***	***1***	***376***	***3***	***77***	***1***	***6***	***0***	***3***	***0***
L	December	22,718	269	58	2	2	65	1	36	0	10	0	1	0
M	Avg Annual Reduction of Catch	-24,191	-161	-38	-1	-1	-376	-3	-77	-1	-6	0	-3	0
N	Change in Catch During Hotspot Closure	10,741	80	15	0	1	29	0	24	0	4	0	1	0
O	Net Change with Redistribution (M+N)	-13,450	-81	-23	-1	0	-347	-3	-53	-1	-2	0	-2	0
P	Avg Annual # Interactions in Hotspot (Sum A to L)	580,127	2,954	324	45	232	6,830	80	1,343	17	6,760	10	65	1
Q	Avg Annual Percent Change in Area ((O/P)*100)	-2.32%	-2.74%	-7.10%	-2.22%	0.00%	-5.08%	-3.75%	-3.95%	-5.88%	-0.03%	0.00%	-3.08%	0.00%
R	Average Annual # Interactions (∑(All PLL Interactions 2008-2014)	6,764,456	41,389	7,277	394	882	41,457	1,076	13,993	445	43,805	312	2,424	68
S	Percent Change in Fishery ((O/R)*100)	-0.20%	-0.20%	-0.32%	-0.25%	0.00%	-0.84%	-0.28%	-0.38%	-0.22%	0.00%	0.00%	-0.08%	0.00%

Table 4.21 Anticipated ecological impacts on select large coastal sharks as a result of Hatteras Shelf hotspot closure (Nov). Source: HMS Logbook Data from 2008-2014.

	2008 - 2014 Average Annual Interactions	Blacktip Kept	Blacktip Discarded	Spinner Kept	Spinner Discarded	Tiger Kept	Tiger Discarded
A	January	0	1	0	0	0	4
B	February	0	0	0	2	0	5
C	March	0	1	1	3	1	20
D	April	0	1	1	2	3	42
E	May	0	2	1	7	1	40
F	June	0	0	12	23	0	17
G	July	0	1	2	1	1	3
H	August	0	0	0	1	0	1
I	September	0	1	1	1	0	2
J	October	0	0	0	1	0	2
K	November	0	0	0	1	1	3
L	December	0	0	0	1	0	3
M	Avg Annual Reduction of Catch	0	0	0	-1	-1	-3
N	Change in Catch During Hotspot Closure	0	0	0	0	0	3
O	Net Change with Redistribution (M+N)	0	0	0	-1	-1	0
P	Avg Annual # Interactions in Hotspot (Sum A to L)	0	7	18	43	7	142
Q	Avg Annual Percent Change in Area ((O/P)*100)	0.00%	0.00%	0.00%	-2.33%	-14.29%	0.00%
R	Average Annual # Interactions (∑(All PLL Interactions 2008-2014)	8	121	23	107	29	1,854
S	Percent Change in Fishery ((O/R)*100)	0.00%	0.00%	0.00%	-0.93%	-3.45%	0.00%

Table 4.22 Anticipated ecological impacts on select pelagic sharks as a result of the Hatteras Shelf hotspot closure (Nov). Source: HMS Logbook Data from 2008-2014.

	2008 - 2014 Average Annual Interactions	Blue Kept	Blue Discards	Shortfin Mako Kept	Shortfin Mako Discarded	Porbeagle Kept	Porbeagle Discards	Common Thresher Kept	Common Thresher Discards
A	January	10	53	123	23	0	0	7	7
B	February	15	91	190	5	0	1	16	8
C	March	17	94	85	2	0	0	11	1
D	April	41	155	242	2	0	0	26	2
E	May	4	92	140	3	0	0	8	2
F	June	3	27	22	2	0	0	1	1
G	July	1	11	9	1	0	0	0	1
H	August	0	3	9	0	0	0	1	1
I	September	0	2	10	1	0	0	0	1
J	October	0	5	13	1	0	0	1	1
K	***November***	***4***	***27***	***68***	***3***	***0***	***0***	***1***	***1***
L	December	15	41	56	7	0	0	4	2
M	Avg Annual Reduction of Catch	-4	-27	-68	-3	0	0	-1	-1
N	Change in Catch During Hotspot Closure	1	73	23	1	0	0	0	0
O	Net Change with Redistribution (M+N)	-3	46	-45	-2	0	0	-1	-1
P	Avg Annual # Interactions in Hotspot (Sum A to L)	110	601	967	50	0	1	76	28
Q	Avg Annual Percent Change in Area ((O/P)*100)	-2.73%	7.65%	-4.65%	-4.00%	0.00%	0.00%	-1.32%	-3.57%
R	Average Annual # Interactions (∑(All PLL Interactions 2008-2014)	386	32,815	2,919	795	5	185	92	110
S	Percent Change in Fishery ((O/R)*100)	-0.78%	0.14%	-1.54%	-0.25%	0.00%	0.00%	-1.09%	-0.91%

Conclusion of Alternative B4d
An objective of this rulemaking is to end overfishing and rebuild dusky sharks by reducing fishing mortality of dusky sharks. This area was identified as a "hotspot" in the original Amendment 5 DEIS analysis because at least 10 dusky shark interactions were reported in the HMS Logbook between 2008 and 2010 in this discrete area, and resulted in an estimated reduction of dusky shark interactions by approximately 6 percent. Incorporation of new data and new analysis methods resulted in an overall pelagic longline fishery reduction of dusky shark interactions by 14 sharks (-2.61 percent). There are minimal reductions that would be achieved under this hotspot closure. Therefore, this alternative is not preferred at this time.

Alternative B4e: Prohibit the use of pelagic longline gear in HMS fisheries in three distinct closures in the vicinity of the Mid Atlantic Bight Canyons ("Canyons Hotspot") during the month of October (Figure 4.7).

Closure of the Canyons Hotspots in October (Alternative B4e) would result in short- and long-term direct, minor, beneficial ecological impacts on dusky shark populations. The direct ecological impacts on 23 HMS and non HMS-target species, prohibited species, and other bycatch depends on the species and whether or not interactions increase or decrease after redistribution of fishing effort from the closed to adjacent open areas in the Charleston Bump. Table 4.23 through Table 4.27 describe the impacts of the proposed closure for individual species. Most of these direct impacts are anticipated to be minor in nature (beneficial or adverse depending on whether or not kept catch and discards decrease or increase) as most changes are less than 5 percent (fishery-wide) with the exception of a reduction in anticipated number of bignose shark discards (-6.67 percent, equivalent to 1 shark/year) (Table 4.23). Given the minor direct impacts on most species, the indirect impacts of alternative B4a on ecosystem function and predator/prey relationships are anticipated to be neutral in the short and long-term.

This alternative may have locally minor to moderate, beneficial impacts on target and bycatch species through an annual effort reduction of 8.23 percent (-32,567 hooks/year) after redistribution of effort, however the anticipated fishery-wide reduction in hooks set as a result of this closure is expected to be less than 1 percent (i.e., negligible impacts on target and bycatch species overall) (Table 4.25). Before redistribution of effort is applied, this alternative would result in an average annual reduction of 109,314 hooks/year deployed.

Based on the redistribution of effort model, we anticipate that dusky shark interactions could be reduced by 14 sharks/year (- 2.60 percent, fishery-wide), and sandbar shark discards could decrease by 9 sharks/year (-1.30 percent) fishery-wide (Table 4.23), with the implementation of this hotspot closure. Localized reductions in dusky (-40.00 percent) and sandbar (-21.43 percent) shark discards could occur. After redistribution of effort from the closed area to adjacent open areas in the Mid- and South-Atlantic Bight, the number of bluefin tuna kept and discarded could decrease by 2 and 1 fish/year, respectively, implying minimal fishery-wide direct effects (Table 4.25).

Direct and indirect, minor, beneficial, ecological impacts for some prohibited pelagic longline species and protected resources are expected in the short- and long-term (Table 4.24). This hotspot closure is anticipated to have minor, beneficial impacts on leatherback and loggerhead

sea turtles due to an anticipated reduction in interactions by 1 turtle each. Localized direct ecological impacts on prohibited billfish could be minor and beneficial due to a reduction in discards of white marlin (-5 fish/year, -5.68 percent), however fishery-wide impacts would be negligible (-0.46 percent). The redistribution model suggests that blue marlin and sailfish discards could increase slightly (+1 fish/year each), indicating the potential for minor adverse ecological effects. Fishery-wide, these effects would likely be negligible (i.e., less than 1 percent change). Following redistribution of effort, neutral ecological impacts are assumed for hammerhead, silky, and oceanic whitetip sharks.

Vessels fishing during this time in the closure are targeting swordfish, yellowfin tuna, bigeye tuna, dolphin, and wahoo (Table 4.25). In general, localized and fishery-wide impacts on target species are expected to be minor and beneficial due to a small reduction (< 10 percent) in the numbers of fish/year retained and discarded locally and fishery-wide. The numbers of swordfish and bigeye tuna retained by the pelagic longline fishery could decrease fishery-wide by 0.68 percent (-282 fish/year) and 1.54 percent (-215 fish/year), respectively, if this hotspot closure was implemented. The redistribution model suggests the potential for a slight increase in the number of bigeye tuna discarded (+2 fish/year, +0.45 percent) and dolphin retained (+14 fish/year, +0.03 percent), which may be due to relocation of effort from closed areas to adjacent areas that have higher catch-per-unit effort. The actual effect of this increase is likely negligible due to the magnitude of the predicted change.

Direct ecological effects on select large coastal and pelagic sharks are shown in Table 4.26 and Table 4.27. Fishery-wide minor, beneficial ecological impacts are anticipated as a result of this closure for select large coastal and pelagic shark species because reductions in the number retained and discarded are equivalent to less than a 5 percent change. Localized ecological impacts for blacktip shark discarded (-50.00 percent), tiger shark retained (-25.00 percent), common thresher shark retained (-11.11 percent) and common thresher shark discarded (-33.33 percent) appear to be moderate and beneficial; however, these fairly high percentages are derived from reductions of a single fish/year from an overall small number of interactions for each, and fishery-wide impacts are either negligible or minor and beneficial (i.e., less than 5 percent reduction). The redistribution model predicted a potential increase in the number of blue sharks retained, which may have been a result of redistribution of effort from the hotspot closure to adjacent areas that had higher catch-per-unit effort. The overall effect of this increase, however, is minimal when compared to total fishery-wide interactions (+1 shark/year, +0.26 percent).

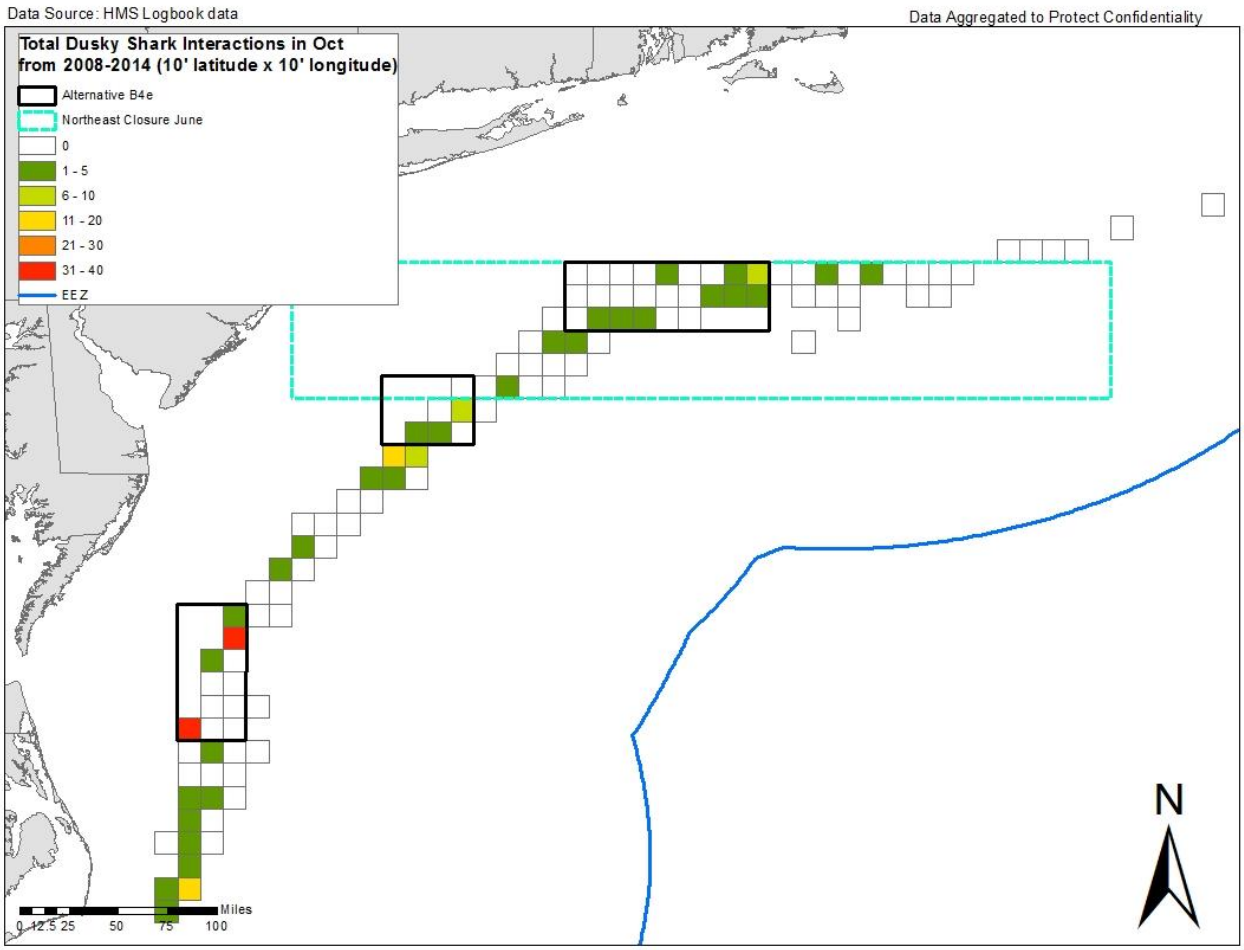

Figure 4.7 Map of total dusky shark interactions occurring in Mid-Atlantic Bight Canyons Hotspot Closure during the month of October and aggregated in 10' X 10' grid cells. Source: HMS Logbook Data from 2008-2014.

Table 4.23 Anticipated ecological impacts on prohibited sharks/bycatch as a result of the Mid-Atlantic Bight Canyons hotspot closure (Oct). Source: HMS Logbook Data from 2008-2014.

	2008 - 2014 Average Annual Interactions	Dusky Discards	Sandbar Discards	Night Discards	Bignose Discards	White Discards	Longfin Mako Discards	Bigeye Thresher Discards
A	January	0	0	0	0	0	0	1
B	February	0	0	0	0	0	0	0
C	March	0	0	0	0	0	0	0
D	April	0	0	0	0	0	0	0
E	May	0	0	0	0	0	0	1
F	June	1	1	1	2	0	1	1
G	July	3	2	1	1	0	3	1
H	August	8	16	1	1	0	2	1
I	September	3	6	0	1	0	3	1
J	***October***	***18***	***14***	***2***	***1***	***0***	***3***	***2***
K	November	1	3	0	0	0	3	1
L	December	1	0	0	0	0	1	1
M	Average Annual Reduction of Catch (= -J)	-18	-14	-2	-1	0	-3	-2
N	Change in Catch During Hotspot Closure	4	5	3	0	0	2	2
O	Net Change with Redistribution (M+N)	-14	-9	1	-1	0	-1	0
P	Total Average Annual # Interactions in Hotspot Closure (Sum A to L)	35	42	5	6	0	16	10
Q	Average Annual Percent Change in Area ((O/P)*100)	-40.00%	-21.43%	20.00%	-16.67%	0.00%	-6.25%	0.00%
R	Average Annual # Interactions (∑(All PLL Interactions 2008-2014)	538	692	507	15	18	262	277
S	Percent Change in Fishery ((O/R)*100)	-2.60%	-1.30%	0.20%	-6.67%	0.00%	-0.38%	0.00%

Table 4.24 Anticipated ecological impacts on prohibited HMS/bycatch as a result of the Mid-Atlantic Bight Canyons hotspot closure (Oct). Source: HMS Logbook Data from 2008-2014.

	2008 - 2014 Average Annual Interactions	White Marlin Discards	Blue Marlin Discards	Sailfish Discards	Spearfish Discards	Leatherback Sea Turtles	Loggerhead Sea Turtles	Hammer-head Kept / Discard*	Silky Kept / Discard^	Oceanic Whitetip Kept / Discard*
A	January	0	0	0	0	0	0	1	0	0
B	February	0	0	0	0	0	0	0	0	0
C	March	0	0	0	0	0	0	0	0	0
D	April	0	0	0	0	0	0	0	0	0
E	May	0	0	0	0	0	0	1	0	0
F	June	2	1	1	1	1	0	6	2	0
G	July	24	3	1	7	1	1	6	3	1
H	August	24	3	1	2	1	1	31	2	0
I	September	25	2	1	3	1	1	20	2	0
J	***October***	***12***	***1***	***0***	***0***	***1***	***1***	10	2	0
K	November	1	0	0	0	1	1	3	3	0
L	December	0	0	0	0	0	0	1	2	0
M	Average Annual Reduction of Catch (= -J)	-12	-1	0	0	-1	-1	-10	-2	0
N	Change in Catch During Hotspot Closure	7	2	1	0	0	0	10	2	0
O	Net Change with Redistribution (M+N)	-5	1	1	0	-1	-1	0	0	0
P	Total Average Annual # Interactions (or Hooks) in Hotspot Closure (Sum A to L)	88	10	4	13	6	5	79	16	1
Q	Average Annual Percent Change in Area ((O/P)*100)	-5.68%	10.00%	25.00%	0.00%	-16.67%	-20.00%	0.00%	0.00%	0.00%
R	Average Annual # Interactions (∑(All PLL Interactions 2008-2014)	1,076	744	553	278	91	53	1,486	1,724	197
S	Percent Change in Fishery ((O/R)*100)	-0.46%	0.13%	0.18%	0.00%	-1.10%	-1.89%	0.00%	0.00%	0.00%

*ICCAT Fisheries, including HMS Pelagic Longline, are prohibited from retaining, transshipping, or landing Hammerhead or Oceanic Whitetip Sharks (76 FR 53652; August 29, 2011), per ICCAT recommendations 10-07 and 10-08.

^ICCAT Fisheries, including HMS Pelagic Longline, are prohibited from retaining, transshipping, or landing Silky Sharks (77 FR 60632; October 4, 2012), per ICCAT recommendation 11-08.

Table 4.25 Anticipated ecological impacts on HMS and non-HMS target species as a result of the Mid-Atlantic Bight hotspot closure (Nov). Source: HMS Logbook Data from 2008-2014.

	2008 - 2014 Average Annual Interactions	Hooks	SWO Kept	SWO Discards	BFT Kept	BFT Discards	YFT Kept	YFT Discards	BET Kept	BET Discards	Dolphin Kept	Dolphin Discards	Wahoo Kept	Wahoo Discards
A	January	10,321	132	24	2	14	22	0	5	1	0	0	0	0
B	February	786	6	1	1	1	0	0	0	0	0	0	0	0
C	March	279	1	1	0	0	0	0	1	0	0	0	0	0
D	April	148	1	0	0	0	1	0	0	0	0	0	0	0
E	May	2,116	8	1	1	2	16	2	4	0	5	0	0	0
F	June	10,739	37	3	1	3	119	3	28	0	78	1	1	0
G	July	64,188	122	25	5	1	856	29	251	6	244	1	3	0
H	August	54,496	126	30	1	0	479	24	204	5	70	1	2	0
I	September	70,873	247	52	1	1	355	14	365	8	60	1	4	1
J	***October***	***109,314***	***728***	***164***	***3***	***2***	***571***	***15***	***548***	***4***	***76***	***2***	***11***	***0***
K	November	48,827	355	84	7	30	129	2	167	3	11	0	2	0
L	December	23,700	201	44	4	61	32	1	69	0	5	0	1	0
M	Average Annual Reduction of Catch (= -J)	-109,314	-728	-164	-3	-2	-571	-15	-548	-4	-76	-2	-11	0
N	Change in Catch During Hotspot Closure	76,747	446	112	1	1	520	14	333	6	90	2	6	1
O	Net Change with Redistribution (M+N)	-32,567	-282	-52	-2	-1	-51	-1	-215	2	14	0	-5	1
P	Total Average Annual # Interactions (or Hooks) in Hotspot Closure (Sum A to L)	395,787	1,964	429	26	115	2,580	90	1,642	27	549	6	24	1
Q	Average Annual Percent Change in Area ((O/P)*100)	-8.23%	-14.36%	-12.12%	-7.69%	-0.87%	-1.98%	-1.11%	-13.09%	7.41%	2.55%	0.00%	-20.83%	100.00%
R	Average Annual # Interactions (∑(All PLL Interactions 2008-2014)	6,764,457	41,389	7,277	394	882	41,457	1,076	13,993	445	43,805	312	2,424	68
S	Percent Change in Fishery ((O/R)*100)	-0.48%	-0.68%	-0.71%	-0.51%	-0.11%	-0.12%	-0.09%	-1.54%	0.45%	0.03%	0.00%	-0.21%	1.47%

Table 4.26 Anticipated ecological impacts on select large coastal sharks as a result of the Mid-Atlantic Bight Canyons hotspot closure (Oct). Source: HMS Logbook Data from 2008-2014.

	2008 - 2014 Average Annual Interactions	Blacktip Kept	Blacktip Discarded	Spinner Kept	Spinner Discarded	Tiger Kept	Tiger Discarded
A	January	0	0	0	0	0	1
B	February	0	0	0	0	0	0
C	March	0	0	0	0	0	0
D	April	0	0	0	0	0	0
E	May	0	0	0	0	0	1
F	June	0	0	0	0	0	3
G	July	0	0	0	0	1	19
H	August	0	0	0	0	1	15
I	September	0	1	0	0	1	13
J	***October***	***0***	***1***	***0***	***0***	***1***	***78***
K	November	0	0	0	0	0	6
L	December	0	0	0	0	0	1
M	Average Annual Reduction of Catch (= -J)	0	-1	0	0	-1	-78
N	Change in Catch During Hotspot Closure	0	0	0	0	0	16
O	Net Change with Redistribution (M+N)	0	-1	0	0	-1	-62
P	Total Average Annual # Interactions (or Hooks) in Hotspot Closure (Sum A to L)	0	2	0	0	4	137
Q	Average Annual Percent Change in Area ((O/P)*100)	0.00%	-50.00%	0.00%	0.00%	-25.00%	-45.26%
R	Average Annual # Interactions (∑(All PLL Interactions 2008-2014)	8	121	23	107	29	1,854
S	Percent Change in Fishery ((O/R)*100)	0.00%	-0.83%	0.00%	0.00%	-3.45%	-3.34%

Table 4.27 Anticipated ecological impacts on select pelagic sharks as a result of the Mid-Atlantic Bight Canyons hotspot closure (Oct). Source: HMS Logbook Data from 2008-2014.

	2008 - 2014 Average Annual Interactions	Blue Kept	Blue Discards	Shortfin Mako Kept	Shortfin Mako Discarded	Porbeagle Kept	Porbeagle Discards	Common Thresher Kept	Common Thresher Discards
A	January	8	62	40	3	0	0	1	0
B	February	0	1	4	0	0	0	1	0
C	March	0	62	1	0	0	0	0	0
D	April	0	2	3	0	0	0	1	0
E	May	1	23	3	0	0	0	1	0
F	June	7	32	14	1	0	0	1	1
G	July	2	126	33	4	0	1	0	1
H	August	5	120	24	7	0	0	0	0
I	September	1	247	37	3	0	0	0	0
J	***October***	***1***	***1,188***	***90***	***17***	***0***	***0***	***1***	***1***
K	November	3	774	71	4	0	0	2	0
L	December	1	258	39	2	1	0	1	0
M	Average Annual Reduction of Catch (= -J)	-1	-1,188	-90	-17	0	0	-1	-1
N	Change in Catch During Hotspot Closure	2	536	34	6	0	0	0	0
O	Net Change with Redistribution (M+N)	1	-652	-56	-11	0	0	-1	-1
P	Total Average Annual # Interactions (or Hooks) in Hotspot Closure (Sum A to L)	29	2,895	359	41	1	1	9	3
Q	Average Annual Percent Change in Area ((O/P)*100)	3.45%	-22.52%	-15.60%	-26.83%	0.00%	0.00%	-11.11%	-33.33%
R	Average Annual # Interactions (∑(All PLL Interactions 2008-2014)	386	32,815	2,919	795	5	185	92	110
S	Percent Change in Fishery ((O/R)*100)	0.26%	-1.99%	-1.92%	-1.38%	0.00%	0.00%	-1.09%	-0.91%

Alternative B4e Conclusion
An objective of this rulemaking is to end overfishing and rebuild dusky sharks by reducing fishing mortality of dusky sharks. This area was identified as a "hotspot" in the draft Amendment 5 analysis because at least 10 dusky shark interactions were reported in the HMS Logbook between 2008 and 2010 in this discrete area, and resulted in an estimated reduction of dusky shark interactions by approximately 6 percent. Incorporation of new data and new analysis methods resulted in an overall fishery reduction of dusky shark interactions by 14 sharks (-2.60 percent). With this minimal reduction in dusky sharks achieved under this hotspot closure, this sub-alternative is not preferred at this time.

Alternative B4f: Prohibit the use of pelagic longline gear in HMS fisheries in an area in the vicinity of the existing Northeastern closed area during the month of July ("Southern Georges Banks Hotspot July") (Figure 4.8).

Closure of the Southern Georges Bank Hotspot in July (Alternative B4f) would result in short- and long-term direct, minor, beneficial ecological impacts on the dusky shark population. The direct ecological impacts on 23 HMS and non HMS-target species, prohibited species, and other bycatch depends on the species and whether or not interactions increase or decrease after redistribution of fishing effort from the closed to adjacent open areas in the Charleston Bump. Table 4.28 through Table 4.32 describe the impacts of the closure for individual species. Most of these direct impacts are anticipated to be minor in nature (beneficial or adverse depending on whether or not kept catch and discards decrease or increase) as most changes are less than 5 percent (fishery-wide). Given the minor direct impacts on most species, the indirect impacts of alternative B4a on ecosystem function and predator/prey relationships are anticipated to be neutral in the short- and long-term.

This alternative may have locally minor to moderate, beneficial impacts on target and bycatch species through an annual effort reduction of 14.06 percent (-47,831 hooks/year) after redistribution of effort, however, the anticipated fishery-wide reduction in hooks set as a result of this closure is expected to be less than 1 percent (i.e., negligible impacts on target and bycatch species overall) (Table 4.30). Before redistribution of effort is applied, this alternative would result in an average annual reduction of 100,655 hooks/year deployed.

Based on the redistribution of effort model, we anticipate that dusky shark interactions could be reduced by 13 sharks/year (- 2.42 percent, fishery-wide), and sandbar shark discards could decrease by 5 sharks/year (-0.72 percent) fishery-wide (Table 4.28), with the implementation of this hotspot. Localized reductions in dusky (-29.55 percent) and sandbar (-15.15 percent) shark discards could occur. After redistribution of effort from the closed area to adjacent open areas in the Mid- and South-Atlantic Bight, the number of bluefin tuna kept and discarded could decrease by 9 fish/year (-2.28 percent) and 20 fish/year (-2.27 percent), respectively, implying minor fishery-wide direct effects (Table 4.30).

Direct and indirect, minor, beneficial, ecological impacts for some prohibited pelagic longline species and protected resources are expected in the short and long-term (Table 4.29). This hotspot closure is anticipated to have minor, beneficial fishery-wide effects on leatherback and loggerhead sea turtles due to an anticipated reduction in interactions of 5 turtles/year (-9.43

percent) and 4 turtles/year (-4.40 percent), respectively. Localized minor beneficial and adverse direct ecological effects on prohibited billfish are anticipated, most of which result in a fishery-wide change of less than 1 percent in the number of interactions. The redistribution model suggests that blue marlin and roundscale spearfish localized discards could increase by 10.00 percent and 13.33 percent, respectively, indicating the potential for minor adverse ecological effects. These estimates are based on extremely small numbers of fish, however, and these effects would likely be negligible fishery-wide (i.e., less than 1 percent change). Following redistribution of effort, neutral ecological impacts are assumed for sailfish and oceanic whitetip shark. The redistribution model also predicts a potential increase in the number of hammerhead shark interactions (+1 shark/year, +0.07 percent) and a decrease in the number of silky shark interactions (-6 shark/year, -0.35 percent).

Vessels fishing during this time in the closure are targeting swordfish, yellowfin tuna, bigeye tuna, dolphin, and wahoo (Table 4.30). In general, localized and fishery-wide impacts on target species are expected to be minor due to small changes (< 5 percent) in the numbers of fish retained and discarded locally and fishery-wide. The numbers of Swordfish retained by the pelagic longline fishery could decrease fishery-wide by 2.23 percent (-925 fish/year) if this hotspot closure was implemented. The redistribution model suggests the potential for a slight increase in the number of yellowfin tuna kept (+31 fish/year, +0.07 percent), yellowfin tuna discarded (+6 fish/year, +0.56 percent), bigeye tuna retained (+58 fish/year, +0.41 percent), bigeye tuna discarded (+4 fish, +0.90 percent) and wahoo retained (+5 fish, +0.21 percent), which may be due to relocation of effort from closed areas to adjacent areas that have higher catch-per-unit effort. The actual effect of this predicted increase is likely negligible due to the magnitude of the predicted change.

Direct ecological impacts on select large coastal and pelagic sharks are shown in Table 4.31 and Table 4.32. Fishery-wide minor beneficial ecological impacts are anticipated as a result of this closure for select large coastal and pelagic shark species due to reductions in the number retained and discarded equivalent to less than a 5 percent change. Localized ecological impacts for blacktip shark discarded (-50.00 percent), tiger shark retained (-40.00 percent), porbeagle discards (-10.00 percent) and common thresher shark discarded (-16.67 percent) appear to be moderate and beneficial; however, these fairly high percentages are derived from reductions of one or two fish/year from an overall small number of interactions for each, and fishery-wide impacts are either negligible or minor and beneficial (i.e., less than 5 percent reduction; except for tiger sharks retained, -6.90 percent). The redistribution model predicted a potential increase in the number of blue sharks retained, which may have been a result of redistribution of effort from the hotspot closure to adjacent areas that had higher catch-per-unit effort. The overall effect of this increase, however, is minimal when compared to total fishery-wide interactions (+4 sharks/year, +1.04 percent).

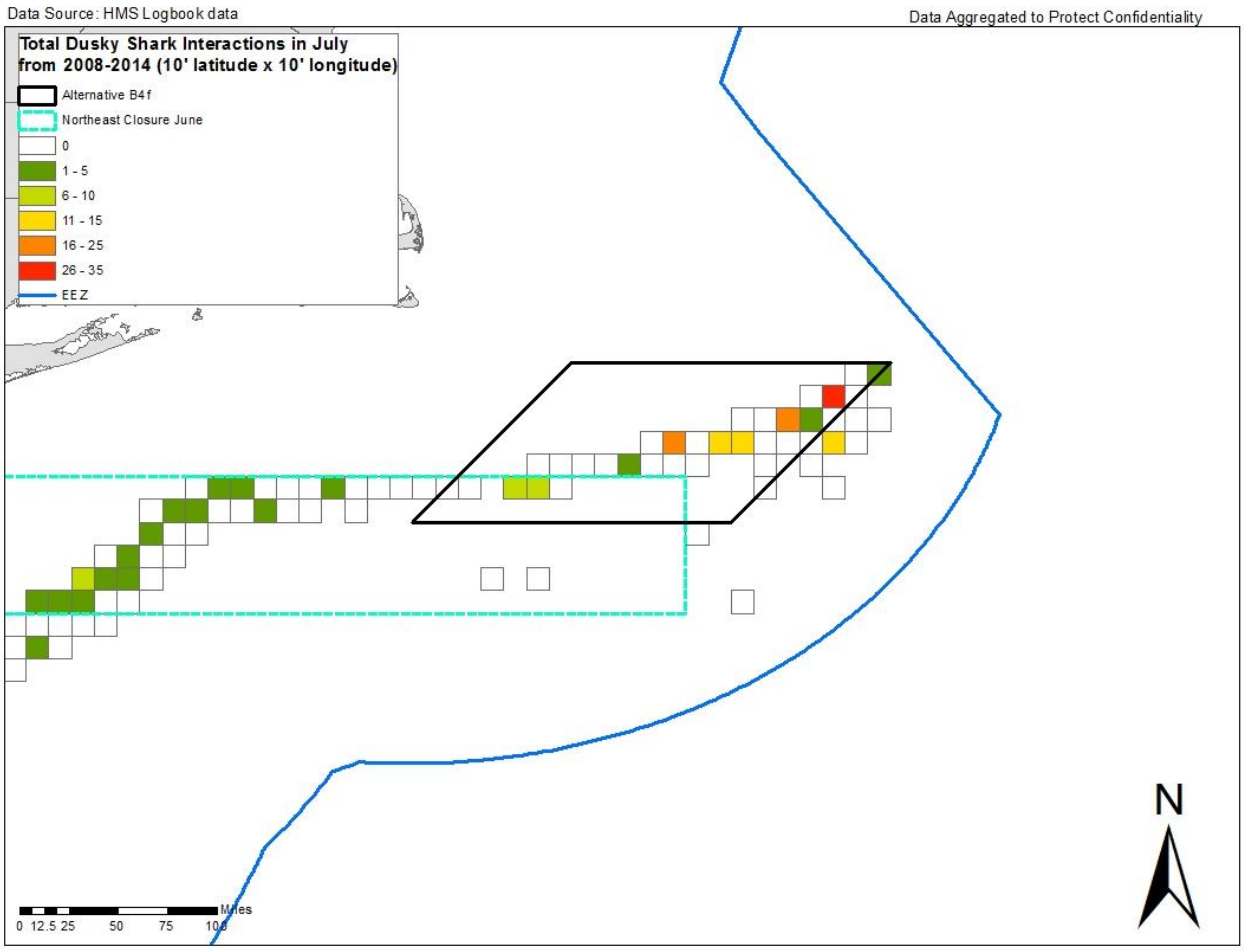

Figure 4.8 Map of total dusky shark interactions occurring in the Southern Georges Bank Hotspot Closure during the month of July and aggregated in 10' X 10' grid cells. Source: HMS Logbook Data from 2008-2014.

Table 4.28 Anticipated ecological impacts on prohibited sharks/bycatch as a result of the Southern Georges Bank hotspot closure (July). Source: HMS Logbook Data from 2008-2014.

	2008 - 2014 Average Annual Interactions	Dusky Discards	Sandbar Discards	Night Discards	Bignose Discards	White Discards	Longfin Mako Discards	Bigeye Thresher Discards
A	January	0	0	0	0	0	0	0
B	February	0	0	0	0	0	0	0
C	March	0	0	0	0	0	0	0
D	April	0	0	0	0	0	0	0
E	May	0	0	0	0	0	0	0
F	June	1	4	0	0	0	2	1
G	***July***	***19***	***7***	***4***	***0***	***0***	***1***	***1***
H	August	13	2	0	1	1	2	1
I	September	10	19	0	0	0	4	1
J	October	1	1	1	0	0	1	1
K	November	0	0	0	0	0	1	0
L	December	0	0	0	0	0	0	0
M	Average Annual Reduction of Catch (= -G)	-19	-7	-4	0	0	-1	-1
N	Change in Catch During Hotspot Closure	6	2	5	1	0	1	1
O	Net Change with Redistribution (M+N)	-13	-5	1	1	0	0	0
P	Total Average Annual # Interactions in Hotspot Closure (Sum A to L)	44	33	5	1	1	11	5
Q	Average Annual Percent Change in Area ((O/P)*100)	-29.55%	-15.15%	20.00%	100.00%	0.00%	0.00%	0.00%
R	Average Annual # Interactions (∑(All PLL Interactions 2008-2014)	538	692	507	15	18	262	277
S	Percent Change in Fishery ((O/R)*100)	-2.42%	-0.72%	0.20%	6.67%	0.00%	0.00%	0.00%

Table 4.29 Anticipated ecological impacts on prohibited HMS/bycatch as a result of the Southern Georges Bank hotspot closure (July). Source: HMS Logbook Data from 2008-2014.

	2008 - 2014 Average Annual Interactions	White Marlin Discards	Blue Marlin Discards	Sailfish Discards	Spearfish Discards	Leatherback Sea Turtles	Loggerhead Sea Turtles	Hammer-head Kept / Discards*	Silky Kept / Discards^	Oceanic Whitetip Kept / Discards*
A	January	0	0	0	0	0	0	0	0	0
B	February	0	0	0	0	0	0	0	0	0
C	March	0	0	0	0	0	0	0	0	0
D	April	0	0	0	0	0	0	0	0	0
E	May	1	0	0	1	0	0	0	0	0
F	June	9	1	0	1	1	3	1	1	1
G	***July***	***8***	***1***	***1***	***4***	***5***	***5***	2	8	0
H	August	19	4	0	6	1	6	6	3	1
I	September	16	2	0	1	1	2	1	4	1
J	October	1	1	0	1	1	1	2	1	1
K	November	1	1	0	1	0	1	0	0	0
L	December	0	0	0	0	0	0	0	0	0
M	Average Annual Reduction of Catch (= -G)	-8	-1	-1	-4	-5	-5	-2	-8	0
N	Change in Catch During Hotspot Closure	7	2	1	6	0	1	3	2	0
O	Net Change with Redistribution (M+N)	-1	1	0	2	-5	-4	1	-6	0
P	Total Average Annual # Interactions (or Hooks) in Hotspot Closure (Sum A to L)	55	10	1	15	9	18	12	17	4
Q	Average Annual Percent Change in Area ((O/P)*100)	-1.82%	10.00%	0.00%	13.33%	-55.56%	-22.22%	8.33%	-35.29%	0.00%
R	Average Annual # Interactions (∑(All PLL Interactions 2008-2014)	1,076	744	553	278	53	91	1,486	1,724	197
S	Percent Change in Fishery ((O/R)*100)	-0.09%	0.13%	0.00%	0.72%	-9.43%	-4.40%	0.07%	-0.35%	0.00%

*ICCAT Fisheries, including HMS Pelagic Longline, are prohibited from retaining, transshipping, or landing Hammerhead or Oceanic Whitetip Sharks (76 FR 53652; August 29, 2011), per ICCAT recommendations 10-07 and 10-08.

^ICCAT Fisheries, including HMS Pelagic Longline, are prohibited from retaining, transshipping, or landing Silky Sharks (77 FR 60632; October 4, 2012), per ICCAT recommendation 11-08.

Table 4.30 Anticipated ecological impacts on HMS and non-HMS target species as a result of the Southern Georges Bank hotspot closure (July). Source: HMS Logbook Data from 2008-2014.

	2008 - 2014 Average Annual Interactions	Hooks	SWO Kept	SWO Discards	BFT Kept	BFT Discards	YFT Kept	YFT Discards	BET Kept	BET Discards	Dolphin Kept	Dolphin Discards	Wahoo Kept	Wahoo Discards
A	January	0	0	0	0	0	0	0	0	0	0	0	0	0
B	February	0	0	0	0	0	0	0	0	0	0	0	0	0
C	March	0	0	0	0	0	0	0	0	0	0	0	0	0
D	April	441	7	0	0	0	0	0	1	0	0	0	0	0
E	May	3,444	48	2	1	11	2	0	2	0	4	0	0	0
F	June	66,973	738	26	9	101	107	1	67	1	189	1	1	0
G	***July***	***100,655***	***1,080***	***52***	***12***	***22***	***437***	***6***	***103***	***2***	***252***	***1***	***3***	***0***
H	August	83,053	529	85	1	6	675	26	232	3	106	2	4	0
I	September	62,142	655	116	1	20	735	40	134	2	48	0	2	0
J	October	16,651	193	30	1	1	175	15	38	1	40	4	1	0
K	November	4,360	39	12	1	2	48	6	10	0	3	0	1	0
L	December	2,393	23	2	0	1	22	0	10	0	3	0	2	0
M	Average Annual Reduction of Catch (= G)	-100,655	-1,080	-52	-12	-22	-437	-6	-103	-2	-252	-1	-3	0
N	Change in Catch During Hotspot Closure	52,824	155	29	3	2	468	12	161	6	140	0	8	0
O	Net Change with Redistribution (M+N)	-47,831	-925	-23	-9	-20	31	6	58	4	-112	-1	5	0
P	Total Average Annual # Interactions (or Hooks) in Hotspot Closure (Sum A to L)	340,112	3,312	325	26	164	2,201	94	597	9	645	8	14	0
Q	Average Annual Percent Change in Area ((O/P)*100)	-14.06%	-27.93%	-7.08%	-34.62%	-12.20%	1.41%	6.38%	9.72%	44.44%	-17.36%	-12.50%	35.71%	0.00%
R	Average Annual # Interactions (∑(All PLL Interactions 2008-2014)	6,764,456	41,389	7,277	394	882	41,457	1,076	13,993	445	43,805	312	2,424	68
S	Percent Change in Fishery ((O/R)*100)	-0.71%	-2.23%	-0.32%	-2.28%	-2.27%	0.07%	0.56%	0.41%	0.90%	-0.26%	-0.32%	0.21%	0.00%

Table 4.31 Anticipated ecological impacts on select large coastal sharks as a result of the Southern Georges Bank hotspot closure (July). Source: HMS Logbook Data from 2008-2014.

	2008 - 2014 Average Annual Interactions	Blacktip Kept	Blacktip Discarded	Spinner Kept	Spinner Discarded	Tiger Kept	Tiger Discarded
A	January	0	0	0	0	0	0
B	February	0	0	0	0	0	0
C	March	0	0	0	0	0	0
D	April	0	0	0	0	0	0
E	May	0	0	0	0	0	1
F	June	0	0	0	0	0	3
G	***July***	***0***	***1***	***0***	***1***	***2***	***61***
H	August	0	1	0	0	1	22
I	September	0	0	0	0	1	22
J	October	0	0	0	0	1	12
K	November	0	0	0	0	0	2
L	December	0	0	0	0	0	0
M	Average Annual Reduction of Catch (= - G)	0	-1	0	-1	-2	-61
N	Change in Catch During Hotspot Closure	0	0	0	1	0	11
O	Net Change with Redistribution (M+N)	0	-1	0	0	-2	-50
P	Total Average Annual # Interactions (or Hooks) in Hotspot Closure (Sum A to L)	0	2	0	1	5	123
Q	Average Annual Percent Change in Area ((O/P)*100)	0.00%	-50.00%	0.00%	0.00%	-40.00%	-40.65%
R	Average Annual # Interactions (∑(All PLL Interactions 2008-2014)	8	121	23	107	29	1,854
S	Percent Change in Fishery ((O/R)*100)	0.00%	-0.83%	0.00%	0.00%	-6.90%	-2.70%

Table 4.32 Anticipated ecological impacts on select pelagic sharks as a result of the Southern Georges Bank hotspot closure (July). Source: HMS Logbook Data from 2008-2014.

	2008 - 2014 Average Annual Interactions	Blue Kept	Blue Discards	Shortfin Mako Kept	Shortfin Mako Discarded	Porbeagle Kept	Porbeagle Discards	Common Thresher Kept	Common Thresher Discards
A	January	0	0	0	0	0	0	0	0
B	February	0	0	0	0	0	0	0	0
C	March	0	0	0	0	0	0	0	0
D	April	0	28	1	0	0	0	0	0
E	May	0	343	3	2	0	0	0	0
F	June	10	2,388	66	13	1	9	1	2
G	***July***	***8***	***1,242***	***126***	***17***	***0***	***1***	***0***	***1***
H	August	1	456	96	13	0	0	0	1
I	September	0	877	75	15	0	0	0	1
J	October	1	488	16	4	0	0	0	1
K	November	0	372	5	2	0	0	0	0
L	December	0	35	2	1	0	0	0	0
M	Average Annual Reduction of Catch (= -G)	-8	-1,242	-126	-17	0	-1	0	-1
N	Change in Catch During Hotspot Closure	12	137	27	3	0	0	0	0
O	Net Change with Redistribution (M+N)	4	-1,105	-99	-14	0	-1	0	-1
P	Total Average Annual # Interactions (or Hooks) in Hotspot Closure (Sum A to L)	20	6,229	390	67	1	10	1	6
Q	Average Annual Percent Change in Area ((O/P)*100)	20.00%	-17.74%	-25.38%	-20.90%	0.00%	-10.00%	0.00%	-16.67%
R	Average Annual # Interactions (∑(All PLL Interactions 2008-2014)	386	32,815	2,919	795	5	185	92	110
S	Percent Change in Fishery ((O/R)*100)	1.04%	-3.37%	-3.39%	-1.76%	0.00%	-0.54%	0.00%	-0.91%

Alternative B4f Conclusion
An objective of this rulemaking is to end overfishing and rebuild dusky sharks by reducing fishing mortality of dusky sharks. This area was identified as a "hotspot" in the draft Amendment 5 analysis because at least 10 dusky shark interactions were reported in the HMS Logbook between 2008 and 2010 in this discrete area, and resulted in an estimated reduction of dusky shark interactions by approximately 5 percent. Incorporation of new data and new analysis methods resulted in an overall fishery reduction of dusky shark interactions by 13 sharks/year (-2.42 percent). Catch of target species would likely decrease, and the redistribution model predicts a loss in effort of approximately 47,800 hooks/year. Due to the minimal reduction in dusky shark interactions achieved under this hotspot closure, this alternative is not preferred at this time.

Alternative B4g: Prohibit the use of pelagic longline gear in HMS fisheries in an area in the vicinity of the existing Northeastern closed area during the month of August ("Southern Georges Banks Hotspot August") (Figure 4.9).

Closure of the Southern Georges Bank Hotspot in August (Alternative B4g) would result in short- and long-term direct, minor, beneficial direct ecological impacts on the dusky shark population. The direct ecological impacts on 23 HMS and non HMS-target species, prohibited species, and other bycatch depends on the species and whether interactions increase or decrease after redistribution of fishing effort from the closed to adjacent open areas in the Charleston Bump. Table 4.33 through Table 4.37 describe the impacts of the proposed closure for individual species. Most of these direct impacts are anticipated to be minor in nature (beneficial or adverse depending on whether or not kept catch and discards decrease or increase) as most changes are less than 5 percent (fishery-wide) with the exception of a reduction in anticipated number of bignose shark discards (-6.67 percent, equivalent to 1 shark/year), a reduction in white shark discards (-5.56 percent, equivalent to 1 shark/year), a reduction in loggerhead sea turtle interactions (-6.59 percent, equivalent to 6 turtles/year), and an increase in the number of porbeagle retained (+60.00 percent, equivalent to 3 sharks/year) (Table 4.33; Table 4.34; Table 4.37). Given the minor direct impacts on most species, the indirect impacts of alternative B4g on ecosystem function and predator/prey relationships are anticipated to be neutral in the short- and long-term.

This alternative may have locally minor to moderate, beneficial impacts on target and bycatch species through an annual effort reduction of 7.53 percent (-25,599 hooks/year) after redistribution of effort, however the anticipated fishery-wide reduction in hooks set as a result of this closure is expected to be less than 1 percent (i.e., negligible impacts on target and bycatch species overall) (Table 4.35). Before redistribution of effort is applied, this alternative would result in an average annual reduction of 83,053 hooks/year deployed.

Based on the redistribution of effort model NMFS anticipates that dusky shark interactions could be reduced by 10 sharks/year (-1.86 percent, fishery-wide), and sandbar shark discards could decrease by 1 shark/year (-0.14 percent) fishery-wide (Table 4.33), with the implementation of this hotspot. Localized reductions in dusky (-22.73 percent) and sandbar (-3.03 percent) shark discards could occur. After redistribution of effort from the closed area to adjacent open areas, the number of bluefin tuna kept and discarded could decrease by 1 fish/year (-0.25 percent) and 5

fish/year (-0.57 percent), respectively, implying minor beneficial fishery-wide direct effects (Table 4.35).

Direct and indirect, minor, beneficial, ecological impacts for some prohibited pelagic longline species and protected resources are expected in the short and long-term (Table 4.34). This alternative is anticipated to have minor, beneficial fishery-wide effects on leatherback and loggerhead sea turtles due to an anticipated reduction in interactions of 1 turtle/year (-1.89 percent) and 6 turtles (-6.59 percent), respectively. Localized minor beneficial and adverse direct ecological effects on prohibited billfish are anticipated, most of which result in a fishery-wide change of less than 2 percent in the number of interactions. The redistribution model suggests that blue marlin and sailfish localized discards could increase by 10 percent and 100 percent, respectively, indicating the potential for minor adverse ecological impacts. Fishery-wide, these impacts would likely be negligible (i.e., less than 1 percent change) since these figures are based on an estimated increase in interactions by only 1 fish/year. Following redistribution of effort, neutral ecological impacts are assumed for hammerhead and oceanic whitetip sharks. The redistribution model also predicts a potential increase in the number of silky shark interactions (+1 fish/year, +0.06 percent).

Vessels fishing during this time in the hotspot closure are targeting swordfish, yellowfin tuna, bigeye tuna, dolphin, and wahoo (Table 4.35). In general, localized and fishery-wide impacts on target species are expected to be minor and mixed due to small changes (< 5 percent) in the numbers of fish retained and discarded locally and fishery-wide. The numbers of swordfish retained by the pelagic longline fishery could decrease fishery-wide by 0.91 percent (-375 fish/year) if this hotspot was implemented. The redistribution model suggests the potential for a minor increase in the number of wahoo retained (+2 fish/year, +0.08 percent), which may be due to relocation of effort from closed areas to adjacent areas that have higher catch-per-unit effort. The actual effect of this predicted increase is likely negligible due to the magnitude of the predicted change.

Direct ecological impacts on select large coastal and pelagic sharks are shown in Table 4.36 and Table 4.37. Fishery-wide minor beneficial ecological impacts are anticipated as a result of this alternative for select large coastal and pelagic shark species due to reductions in the number retained and discarded equivalent to less than a 5 percent change. Localized ecological impacts for blacktip shark discarded (-50.00 percent), tiger shark retained (-20.00 percent), and common thresher shark discarded (-16.67 percent) appear to be moderate and beneficial; however, these fairly high percentages are derived from reductions of one or two fish/year from an overall small number of interactions for each, and fishery-wide impacts are either negligible or minor and beneficial (i.e., less than 5 percent reduction). The redistribution model predicted a potential increase in the number of porbeagle retained, which may have been a result of redistribution of effort from the hotspot closure to adjacent areas that had higher catch-per-unit effort. The overall impact of this increase, however, is minimal when compared to total fishery-wide interactions (+3 sharks/year, +60.00 percent).

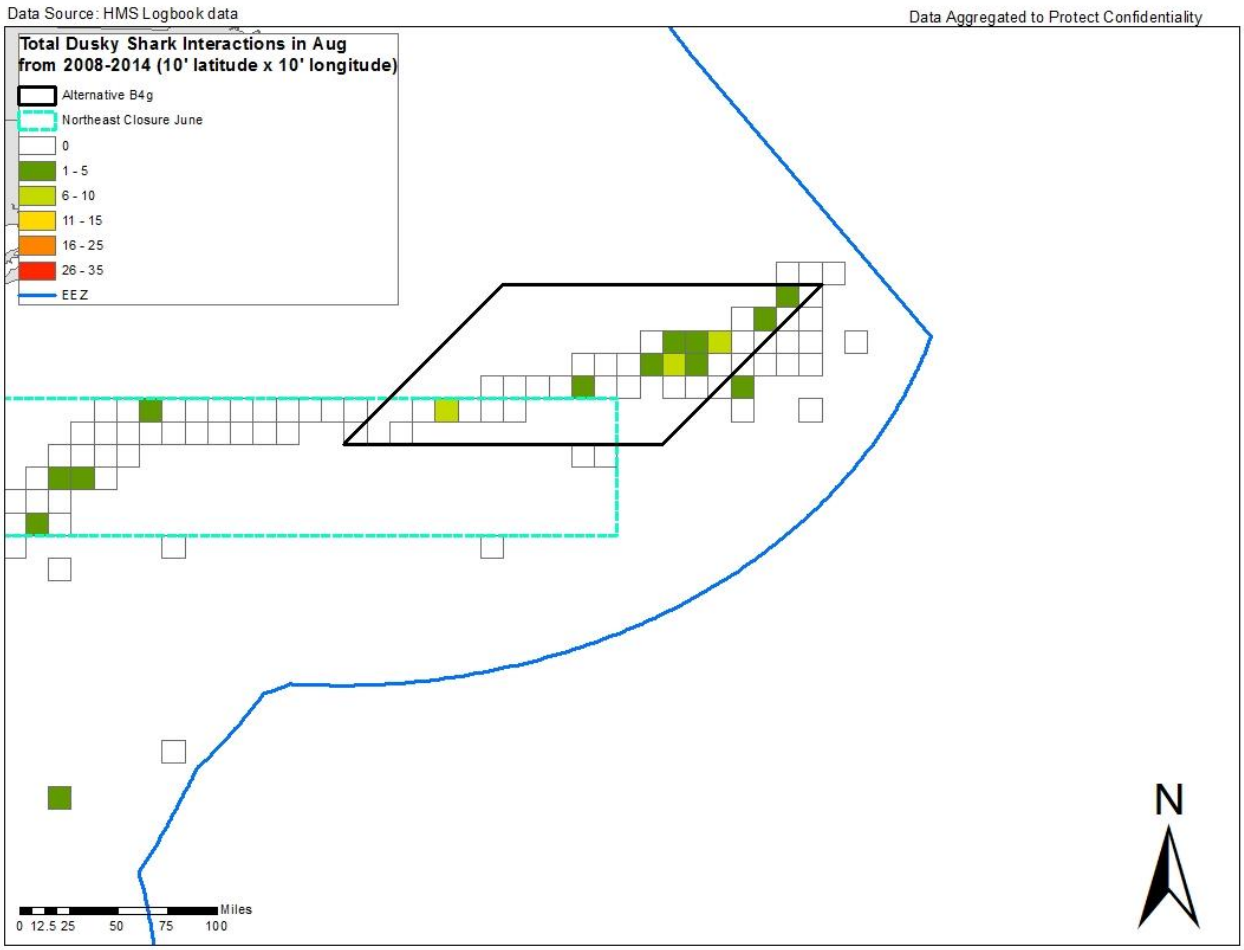

Figure 4.9 Map of total dusky shark interactions occurring in the Southern Georges Bank Hotspot Closure during the month of August and aggregated in 10' X 10' grid cells. Source: HMS Logbook Data from 2008-2014.

Table 4.33 Anticipated ecological impacts on prohibited sharks/bycatch as a result of the Southern Georges Bank hotspot closure (Aug). Source: HMS Logbook Data from 2008-2014.

	2008 - 2014 Average Annual Interactions	Dusky Discards	Sandbar Discards	Night Discards	Bignose Discards	White Discards	Longfin Mako Discards	Bigeye Thresher Discards
A	January	0	0	0	0	0	0	0
B	February	0	0	0	0	0	0	0
C	March	0	0	0	0	0	0	0
D	April	0	0	0	0	0	0	0
E	May	0	0	0	0	0	0	0
F	June	1	4	0	0	0	2	1
G	July	19	7	4	0	0	1	1
H	***August***	***13***	***2***	***0***	***1***	***1***	***2***	***1***
I	September	10	19	0	0	0	4	1
J	October	1	1	1	0	0	1	1
K	November	0	0	0	0	0	1	0
L	December	0	0	0	0	0	0	0
M	Average Annual Reduction of Catch (= H)	-13	-2	0	-1	-1	-2	-1
N	Change in Catch During Hotspot Closure	3	1	2	0	0	1	1
O	Net Change with Redistribution (M+N)	-10	-1	2	-1	-1	-1	0
P	Total Average Annual # Interactions (or Hooks) in Hotspot Closure (Sum A to L)	44	33	5	1	1	11	5
Q	Average Annual Percent Change in Area ((O/P)*100)	-22.73%	-3.03%	40.00%	-100.00%	-100.00%	-9.09%	0.00%
R	Average Annual # Interactions (∑(All PLL Interactions 2008-2014)	538	692	507	15	18	262	277
S	Percent Change in Fishery ((O/R)*100)	-1.86%	-0.14%	0.39%	-6.67%	-5.56%	-0.38%	0.00%

Table 4.34 Anticipated ecological impacts on prohibited HMS/bycatch as a result of the Southern Georges Bank hotspot closure (Aug). Source: HMS Logbook Data from 2008-2014.

	2008 - 2014 Average Annual Interactions	White Marlin Discards	Blue Marlin Discards	Sailfish Discards	Spearfish Discards	Leatherback Sea Turtles	Loggerhead Sea Turtles	Hammerhead Kept / Discarded*	Silky Kept / Discarded^	Oceanic Whitetip Kept / Discarded*
A	January	0	0	0	0	0	0	0	0	0
B	February	0	0	0	0	0	0	0	0	0
C	March	0	0	0	0	0	0	0	0	0
D	April	0	0	0	0	0	0	0	0	0
E	May	1	0	0	1	0	0	0	0	0
F	June	9	1	0	1	1	3	1	1	1
G	July	8	1	1	4	5	5	2	8	0
H	***August***	***19***	***4***	***0***	***6***	***1***	***6***	6	3	1
I	September	16	2	0	1	1	2	1	4	1
J	October	1	1	0	1	1	1	2	1	1
K	November	1	1	0	1	0	1	0	0	0
L	December	0	0	0	0	0	0	0	0	0
M	Average Annual Reduction of Catch (= -H)	-19	-4	0	-6	-1	-6	-6	-3	-1
N	Change in Catch During Hotspot Closure	17	5	1	1	0	0	6	4	1
O	Net Change with Redistribution (M+N)	-2	1	1	-5	-1	-6	0	1	0
P	Total Average Annual # Interactions (or Hooks) in Hotspot Closure (Sum A to L)	55	10	1	15	9	18	12	17	4
Q	Average Annual Percent Change in Area ((O/P)*100)	-3.64%	10.00%	100.00%	-33.33%	-11.11%	-33.33%	0.00%	5.88%	0.00%
R	Average Annual # Interactions (∑(All PLL Interactions 2008-2014)	1,076	744	553	278	53	91	1,486	1,724	197
	Percent Change in Fishery ((O/R)*100)	-0.19%	0.13%	0.18%	-1.80%	-1.89%	-6.59%	0.00%	0.06%	0.00%

*ICCAT Fisheries, including HMS Pelagic Longline, are prohibited from retaining, transshipping, or landing Hammerhead or Oceanic Whitetip Sharks (76 FR 53652; August 29, 2011), per ICCAT recommendations 10-07 and 10-08.

^ICCAT Fisheries, including HMS Pelagic Longline, are prohibited from retaining, transshipping, or landing Silky Sharks (77 FR 60632; October 4, 2012), per ICCAT recommendation 11-08.

Table 4.35 Anticipated ecological impacts on HMS and non-HMS target species as a result of the Southern Georges Bank hotspot closure (Aug). Source: HMS Logbook Data from 2008-2014.

	2008 - 2014 Average Annual Interactions	Hooks	SWO Kept	SWO Discards	BFT Kept	BFT Discards	YFT Kept	YFT Discards	BET Kept	BET Discards	Dolphin Kept	Dolphin Discards	Wahoo Kept	Wahoo Discards
A	January	0	0	0	0	0	0	0	0	0	0	0	0	0
B	February	0	0	0	0	0	0	0	0	0	0	0	0	0
C	March	0	0	0	0	0	0	0	0	0	0	0	0	0
D	April	441	7	0	0	0	0	0	1	0	0	0	0	0
E	May	3,444	48	2	1	11	2	0	2	0	4	0	0	0
F	June	66,973	738	26	9	101	107	1	67	1	189	1	1	0
G	July	100,655	1,080	52	12	22	437	6	103	2	252	1	3	0
H	***August***	***83,053***	***529***	***85***	***1***	***6***	***675***	***26***	***232***	***3***	***106***	***2***	***4***	***0***
I	September	62,142	655	116	1	20	735	40	134	2	48	0	2	0
J	October	16,651	193	30	1	1	175	15	38	1	40	4	1	0
K	November	4,360	39	12	1	2	48	6	10	0	3	0	1	0
L	December	2,393	23	2	0	1	22	0	10	0	3	0	2	0
M	Average Annual Reduction of Catch (= -H)	-83,053	-529	-85	-1	-6	-675	-26	-232	-3	-106	-2	-4	0
N	Change in Catch During Hotspot Closure	57,454	154	33	0	1	365	7	227	3	64	0	6	0
O	Net Change with Redistribution (M+N)	-25,599	-375	-52	-1	-5	-310	-19	-5	0	-42	-2	2	0
P	Total Average Annual # Interactions (or Hooks) in Hotspot Closure (Sum A to L)	340,112	3,312	325	26	164	2,201	94	597	9	645	8	14	0
Q	Average Annual Percent Change in Area ((O/P)*100)	-7.53%	-11.32%	-16.00%	-3.85%	-3.05%	-14.08%	-20.21%	-0.84%	0.00%	-6.51%	-25.00%	14.29%	0.00%
R	Average Annual # Interactions (∑(All PLL Interactions 2008-2014)	6,764,456	41,389	7,277	394	882	41,457	1,076	13,993	445	43,805	312	2,424	68
S	Percent Change in Fishery ((O/R)*100)	-0.38%	-0.91%	-0.71%	-0.25%	-0.57%	-0.75%	-1.77%	-0.04%	0.00%	-0.10%	-0.64%	0.08%	0.00%

Table 4.36 Anticipated ecological impacts on select large coastal sharks as a result of the Southern Georges Bank hotspot closure (Aug). Source: HMS Logbook Data from 2008-2014.

	2008 - 2014 Average Annual Interactions	Blacktip Kept	Blacktip Discarded	Spinner Kept	Spinner Discarded	Tiger Kept	Tiger Discarded
A	January	0	0	0	0	0	0
B	February	0	0	0	0	0	0
C	March	0	0	0	0	0	0
D	April	0	0	0	0	0	0
E	May	0	0	0	0	0	1
F	June	0	0	0	0	0	3
G	July	0	1	0	1	2	61
H	***August***	***0***	***1***	***0***	***0***	***1***	***22***
I	September	0	0	0	0	1	22
J	October	0	0	0	0	1	12
K	November	0	0	0	0	0	2
L	December	0	0	0	0	0	0
M	Average Annual Reduction of Catch (= H)	0	-1	0	0	-1	-22
N	Change in Catch During Hotspot Closure	0	0	0	0	0	11
O	Net Change with Redistribution (M+N)	0	-1	0	0	-1	-11
P	Total Average Annual # Interactions in Hotspot Closure (Sum A to L)	0	2	0	1	5	123
Q	Average Annual Percent Change in Area ((O/P)*100)	0.00%	-50.00%	0.00%	0.00%	-20.00%	-8.94%
R	Average Annual # Interactions (∑(All PLL Interactions 2008-2014)	8	121	23	107	29	1,854
S	Percent Change in Fishery ((O/R)*100)	0.00%	-0.83%	0.00%	0.00%	-3.45%	-0.59%

Table 4.37 Anticipated ecological impacts on select pelagic sharks as a result of the Southern Georges Bank hotspot closure (Aug). Source: HMS Logbook Data from 2008-2014.

	2008 - 2014 Average Annual Interactions	Blue Kept	Blue Discards	Shortfin Mako Kept	Shortfin Mako Discarded	Porbeagle Kept	Porbeagle Discards	Common Thresher Kept	Common Thresher Discards
A	January	0	0	0	0	0	0	0	0
B	February	0	0	0	0	0	0	0	0
C	March	0	0	0	0	0	0	0	0
D	April	0	28	1	0	0	0	0	0
E	May	0	343	3	2	0	0	0	0
F	June	10	2,388	66	13	1	9	1	2
G	July	8	1,242	126	17	0	1	0	1
H	**August**	**1**	**456**	**96**	**13**	**0**	**0**	**0**	**1**
I	September	0	877	75	15	0	0	0	1
J	October	1	488	16	4	0	0	0	1
K	November	0	372	5	2	0	0	0	0
L	December	0	35	2	1	0	0	0	0
M	Average Annual Reduction of Catch (= -H)	-1	-456	-96	-13	0	0	0	-1
N	Change in Catch During Hotspot Closure	1	135	24	2	3	0	0	0
O	Net Change with Redistribution (M+N)	0	-321	-72	-11	3	0	0	-1
P	Total Average Annual # Interactions (or Hooks) in Hotspot Closure (Sum A to L)	20	6,229	390	67	1	10	1	6
Q	Average Annual Percent Change in Area ((O/P)*100)	0.00%	-5.15%	-18.46%	-16.42%	300.00%	0.00%	0.00%	-16.67%
R	Average Annual # Interactions (∑(All PLL Interactions 2008-2014)	386	32,815	2,919	795	5	185	92	110
S	Percent Change in Fishery ((O/R)*100)	0.00%	-0.98%	-2.47%	-1.38%	60.00%	0.00%	0.00%	-0.91%

Alternative B4g Conclusion

An objective of this rulemaking is to end overfishing and rebuild dusky sharks by reducing fishing mortality of dusky sharks. This area was identified as a "hotspot" in the draft Amendment 5 analysis because at least 10 dusky shark interactions were reported in the HMS Logbook between 2008 and 2010 in this discrete area, and resulted in an estimated reduction of dusky shark interactions by approximately 5 percent. Incorporation of new data and new analysis methods resulted in minimal average annual reductions in dusky shark interactions fishery-wide (10 sharks / year, -1.86 percent). Minor, beneficial ecological impacts are expected for target and non-target species as a result of a reduction in effort by approximately 25,599 hooks/year. Due to the minimal reductions in dusky shark interactions expected in the hotspot closure, this alternative is not preferred at this time.

Alternative B4h: Prohibit the use of pelagic longline gear in HMS fisheries in a portion of the Charleston Bump during the month of November ("Charleston Bump Hotspot November") (Figure 4.10).

Closure of the Charleston Bump Hotspot in November (Alternative B4h) would result in short- and long-term direct, minor, beneficial ecological impacts on the dusky shark population. The direct ecological impacts on 23 HMS and non HMS-target species, prohibited species, and other bycatch depends on the species and whether interactions increase or decrease after redistribution of fishing effort from the closed to adjacent open areas in the Charleston Bump. Table 4.38 through Table 4.42 describe the impacts of the closure for individual species. Most of these direct impacts are anticipated to be minor in nature (beneficial or adverse depending on whether or not kept catch and discards decrease or increase) as most changes are less than 5 percent (fishery-wide). Given the minor direct impacts on most species, the indirect impacts of alternative B4g on ecosystem function and predator/prey relationships are anticipated to be neutral in the short- and long-term.

This alternative may have locally minor adverse impacts on target and bycatch species through an annual effort increase of 1.04 percent (+1,448 hooks/year) after redistribution of effort, however, the anticipated fishery-wide change in hooks set as a result of this closure is expected to be less than 1 percent (i.e., negligible impacts on target and bycatch species overall) (Table 4.40). The projected increase in the number of hooks per the redistribution model is likely due to the relocation of effort to areas outside of the closure that have historically had higher numbers of hooks deployed than inside the closure. Before redistribution of effort is applied, this alternative would result in an average annual reduction of 20,450/year hooks deployed. Based on the redistribution of effort model, NMFS anticipates that dusky shark interactions could be reduced by 9 sharks (-1.67 percent, fishery-wide) with the implementation of this hotspot closure (Table 4.38). Ecological impacts on sandbar shark are expected to be neutral. Ecological impacts on night shark could be minor and beneficial due to a reduction in night shark discards (-14 sharks/year, -2.76 percent). After redistribution of effort from the closed area to adjacent open areas, the number of bluefin tuna kept and discarded could increase by 1 fish/year (+0.25 percent) and 1 fish/year (+0.11 percent), respectively, implying the potential for minor, adverse fishery-wide direct effects (Table 4.40).

Direct and indirect, minor, beneficial, ecological impacts for some prohibited pelagic longline species and protected resources are expected in the short- and long-term (Table 4.39). This hotspot closure alternative is anticipated to have minor, beneficial fishery-wide effects on leatherback and loggerhead sea turtles due to an anticipated reduction in interactions of 1 turtle/year each (-1.89 percent and -1.10 percent, respectively). Localized minor beneficial and adverse direct ecological effects on prohibited billfish (sailfish and roundscale spearfish) are anticipated, most of which result in a fishery-wide change of less than 1 percent in the number of interactions. Ecological impacts of implementing this hotspot are expected to be neutral for white and blue marlin. Following redistribution of effort, minor beneficial ecological impacts are assumed for hammerhead, silky, and oceanic whitetip sharks.

Vessels fishing during this time in the hotspot closure are targeting swordfish, yellowfin tuna, bigeye tuna, dolphin, and wahoo (Table 4.40). Localized impacts of this alternative vary by target species, and appear in some instances to be high due to overall small numbers of animals considered. The model predicts that redistribution may increase the numbers of bigeye tuna locally retained (+54 fish/year, +385.71 percent) and discarded (+5 fish/year, +125.00 percent) beyond what was captured in the hotspot closure due to effort being distributed to areas with higher catch per unit effort. In general, fishery-wide impacts on target species are expected to be minor due to small changes (< 2 percent change) in the numbers of fish retained and discarded locally and fishery-wide. The numbers of swordfish retained by the pelagic longline fishery could decrease fishery-wide by 0.55 percent (-227 fish/year) if this hotspot closure alternative was implemented. The redistribution model suggests the potential for a small increase, fishery-wide, in the number of yellowfin tuna retained (+40 fish/year, +0.10 percent), yellowfin tuna discarded (+1 fish, +0.09 percent), bigeye tuna retained (+54 fish/year, +0.39 percent), bigeye tuna discarded (+5 fish/year, +1.12 percent), and dolphin retained (+8 fish/year, +0.02 percent). These changes may be due to relocation of effort from closed areas to adjacent areas that have higher catch-per-unit effort. The actual impact of these predicted increases in the fishery are likely negligible due to the magnitude of the predicted change.

Direct ecological impacts on select large coastal and pelagic sharks are shown in Table 4.41 and Table 4.42. Neutral ecological impacts are anticipated for porbeagle and spinner sharks. Localized ecological impacts for blacktip shark discarded (-14.29 percent), shortfin mako discarded (-11.11 percent), and common thresher shark discarded (-14.29 percent) appear to be minor to moderate and beneficial; however, these fairly high percentages are derived from reductions of one or two fish from an overall small number of interactions for each, and fishery-wide impacts are either negligible or minor and beneficial (i.e., less than 1 percent reduction). The redistribution model predicted a potential localized increase in the number of blue shark retained (+1 shark/year, +50.00 percent) and discarded (+87 sharks/year, +202.33 percent), and shortfin mako retained (+5 sharks/year, +0.17 percent) which may have been a result of redistribution of effort from the hotspot closure to adjacent areas that had higher catch-per-unit effort. Fishery-wide minor beneficial and adverse ecological effects are anticipated as a result of this hotspot closure alternative for select large coastal and pelagic shark species due to reductions or increases in the number of animals retained and discarded; however, in all cases the fishery-wide impacts are equivalent to less than a 1 percent change in the number of animals retained or discarded.

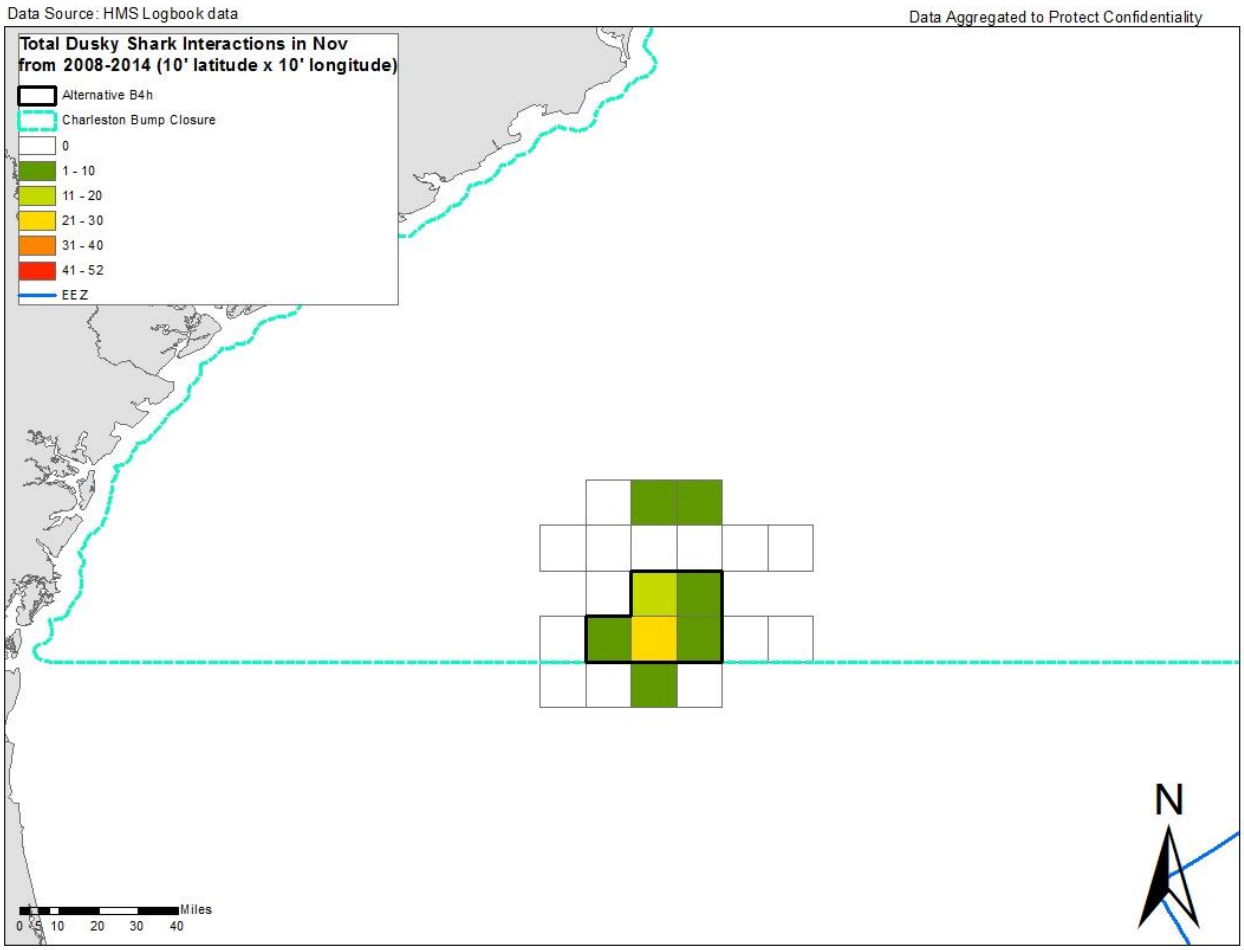

Figure 4.10 Map of total dusky shark interactions occurring in Charleston Bump Hotspot Closure during the month of November and aggregated in 10' X 10' grid cells. Source: HMS Logbook Data from 2008-2014.

Table 4.38 Anticipated ecological impacts on prohibited sharks/bycatch as a result of the pelagic longline Charleston Bump hotspot closure (Nov). Source: HMS Logbook Data from 2008-2014.

	2008 - 2014 Average Annual Interactions	Dusky Discards	Sandbar Discards	Night Discards	Bignose Discards	White Discards	Longfin Mako Discards	Bigeye Thresher Discards
A	January	2	1	7	0	0	1	3
B	February	0	0	6	0	0	0	0
C	March	1	0	8	0	0	0	1
D	April	0	1	26	0	0	0	1
E	May	24	3	46	1	0	1	4
F	June	3	2	23	0	0	1	2
G	July	2	0	13	0	0	1	2
H	August	2	1	6	0	0	1	1
I	September	1	1	5	0	0	0	1
J	October	5	1	12	0	0	1	0
K	***November***	***9***	***0***	***16***	***0***	***0***	***1***	***1***
L	December	3	1	3	0	0	1	3
M	Average Annual Reduction of Catch (= -K)	-9	0	-16	0	0	-1	-1
N	Change in Catch During Hotspot Closure	0	0	2	0	0	0	0
O	Net Change with Redistribution (M+N)	-9	0	-14	0	0	-1	-1
P	Total Average Annual # Interactions (or Hooks) in Hotspot Closure (Sum A to L)	52	11	171	1	0	8	19
Q	Average Annual Percent Change in Area ((O/P)*100)	-17.31%	0.00%	-8.19%	0.00%	0.00%	-12.50%	-5.26%
R	Average Annual # Interactions (∑(All PLL Interactions 2008-2014)	538	692	507	15	18	262	277
S	Percent Change in Fishery ((O/R)*100)	-1.67%	0.00%	-2.76%	0.00%	0.00%	-0.38%	-0.36%

Table 4.39 Anticipated ecological impacts on prohibited HMS/bycatch as a result of the pelagic longline Charleston Bump hotspot closure (Nov). Source: HMS Logbook Data from 2008-2014.

	2008 - 2014 Average Annual Interactions	White Marlin Discards	Blue Marlin Discards	Sailfish Discards	Spearfish Discards	Leatherback Sea Turtles	Loggerhead Sea Turtles	Hammer-head Kept / Discard*	Silky Kept / Discard^	Oceanic Whitetip Kept / Discard*
A	January	1	2	1	1	1	1	2	8	1
B	February	0	0	0	0	0	0	0	2	0
C	March	0	0	0	0	1	0	0	1	0
D	April	1	1	1	1	1	0	1	6	0
E	May	3	4	4	2	0	0	11	64	1
F	June	2	2	2	1	0	0	7	16	2
G	July	1	3	1	0	0	0	5	7	1
H	August	1	3	2	0	1	0	2	6	1
I	September	1	2	1	0	0	0	1	6	1
J	October	1	1	1	0	0	1	2	11	1
K	***November***	***1***	***2***	***2***	***0***	***1***	***1***	**5**	**10**	**2**
L	December	2	1	1	0	1	0	3	8	1
M	Average Annual Reduction of Catch (= -K)	-1	-2	-2	0	-1	-1	-5	-10	-2
N	Change in Catch During Hotspot Closure	1	2	1	2	0	0	2	7	1
O	Net Change with Redistribution (M+N)	0	0	-1	2	-1	-1	-3	-3	-1
P	Total Average Annual # Interactions (or Hooks) in Hotspot Closure (Sum A to L)	14	21	16	5	6	3	39	145	11
Q	Average Annual Percent Change in Area ((O/P)*100)	0.00%	0.00%	-6.25%	40.00%	-16.67%	-33.33%	-7.69%	-2.07%	-9.09%
R	Average Annual # Interactions (∑(All PLL Interactions 2008-2014)	1,076	744	553	278	53	91	1,486	1,724	197
S	Percent Change in Fishery ((O/R)*100)	0.00%	0.00%	-0.18%	0.72%	-1.89%	-1.10%	-0.20%	-0.17%	-0.51%

*ICCAT Fisheries, including HMS Pelagic Longline, are prohibited from retaining, transshipping, or landing Hammerhead or Oceanic Whitetip Sharks (76 FR 53652; August 29, 2011), per ICCAT recommendations 10-07 and 10-08.

^ICCAT Fisheries, including HMS Pelagic Longline, are prohibited from retaining, transshipping, or landing Silky Sharks (77 FR 60632; October 4, 2012), per ICCAT recommendation 11-08.

Table 4.40 Anticipated ecological impacts on HMS and non-HMS target species as a result of the Charleston Bump hotspot closure (Nov). Source: HMS Logbook Data from 2008-2014.

	2008 - 2014 Average Annual Interactions	Hooks	SWO Kept	SWO Discards	BFT Kept	BFT Discards	YFT Kept	YFT Discards	BET Kept	BET Discards	Dolphin Kept	Dolphin Discards	Wahoo Kept	Wahoo Discards
A	January	9,294	146	43	1	0	2	1	0	0	13	0	2	0
B	February	143	7	4	0	0	0	0	0	0	1	0	0	0
C	March	215	9	5	0	0	0	0	0	0	1	0	0	0
D	April	1,833	45	7	0	0	0	0	0	0	59	0	0	0
E	May	44,322	352	39	1	0	26	0	1	0	3,131	12	18	1
F	June	16,056	287	55	2	0	7	0	0	0	168	0	8	0
G	July	7,641	166	46	0	1	2	0	3	2	20	1	7	0
H	August	8,079	256	51	1	0	1	0	2	0	8	1	3	0
I	September	7,625	277	78	0	0	3	0	5	0	8	0	1	0
J	October	12,159	381	116	0	0	12	1	0	1	16	1	3	1
K	***November***	***20,450***	**485**	**188**	**0**	**0**	**5**	**1**	**2**	**1**	**36**	**1**	**6**	**1**
L	December	11,481	241	71	0	0	7	1	1	0	20	1	3	1
M	Average Annual Reduction of Catch (= -K)	-20,450	-485	-188	0	0	-5	-1	-2	-1	-36	-1	-6	-1
N	Change in Catch During Hotspot Closure	21,898	258	55	1	1	45	2	56	6	44	1	4	0
O	Net Change with Redistribution (M+N)	1,448	-227	-133	1	1	40	1	54	5	8	0	-2	-1
P	Total Average Annual # Interactions (or Hooks) in Hotspot Closure (Sum A to L)	139,298	2,652	703	5	1	65	4	14	4	3,481	17	51	4
Q	Average Annual Percent Change in Area ((O/P)*100)	1.04%	-8.56%	-18.92%	20.00%	0.00%	61.54%	25.00%	385.71%	125.00%	0.23%	0.00%	-3.92%	-25.00%
R	Average Annual # Interactions (∑(All PLL Interactions 2008-2014)	6,764,456	41,389	7,277	394	882	41,457	1,076	13,993	445	43,805	312	2,424	68
S	Percent Change in Fishery ((O/R)*100)	0.02%	-0.55%	-1.83%	0.25%	0.11%	0.10%	0.09%	0.39%	1.12%	0.02%	0.00%	-0.08%	-1.47%

Table 4.41 Anticipated ecological impacts on select large coastal sharks as a result of the Charleston Bump hotspot closure (Nov). Source: HMS Logbook Data from 2008-2014.

	2008 - 2014 Average Annual Interactions	Blacktip Kept	Blacktip Discards	Spinner Kept	Spinner Discards	Tiger Kept	Tiger Discards
A	January	0	1	0	0	0	11
B	February	0	0	0	0	0	1
C	March	0	0	0	0	0	0
D	April	0	1	0	0	0	1
E	May	0	2	0	0	0	21
F	June	0	1	0	1	1	8
G	July	0	0	0	1	0	6
H	August	0	0	0	0	1	10
I	September	0	0	0	0	0	5
J	October	0	0	0	1	0	6
K	***November***	***0***	***1***	***0***	***0***	***0***	***8***
L	December	0	1	0	0	0	7
M	Average Annual Reduction of Catch (= -K)	0	-1	0	0	0	-8
N	Change in Catch During Hotspot Closure	0	0	0	0	0	6
O	Net Change with Redistribution (M+N)	0	-1	0	0	0	-2
P	Total Average Annual # Interactions (or Hooks) in Hotspot Closure (Sum A to L)	0	7	0	3	2	84
Q	Average Annual Percent Change in Area ((O/P)*100)	0.00%	-14.29%	0.00%	0.00%	0.00%	-2.38%
R	Average Annual # Interactions (∑(All PLL Interactions 2008-2014)	8	121	23	107	29	1854
S	Percent Change in Fishery ((O/R)*100)	0.00%	-0.83%	0.00%	0.00%	0.00%	-0.11%

Table 4.42 Anticipated ecological impacts on select pelagic sharks as a result of the Charleston Bump hotspot closure (Nov). Source: HMS Logbook Data from 2008-2014.

	2008 - 2014 Average Annual Interactions	Blue Kept	Blue Discards	Shortfin Mako Kept	Shortfin Mako Discarded	Porbeagle Kept	Porbeagle Discards	Common Thresher Kept	Common Thresher Discards
A	January	0	3	2	1	0	0	1	2
B	February	0	0	1	0	0	0	0	0
C	March	0	0	0	0	0	0	0	0
D	April	0	2	0	1	0	0	0	0
E	May	1	20	3	1	0	0	1	2
F	June	1	4	2	1	0	0	0	0
G	July	0	1	2	0	0	0	0	0
H	August	0	3	1	1	0	0	0	0
I	September	0	2	1	1	0	0	0	0
J	October	0	1	2	1	0	0	0	1
K	***November***	***0***	***4***	***4***	***1***	***0***	***0***	***0***	***1***
L	December	0	3	2	1	0	0	0	1
M	Average Annual Reduction of Catch (= -K)	0	-4	-4	-1	0	0	0	-1
N	Change in Catch During Hotspot Closure	1	91	9	0	0	0	0	0
O	Net Change with Redistribution (M+N)	1	87	5	-1	0	0	0	-1
P	Total Average Annual # Interactions (or Hooks) in Hotspot Closure (Sum A to L)	2	43	20	9	0	0	2	7
Q	Average Annual Percent Change in Area ((O/P)*100)	50.00%	202.33%	25.00%	-11.11%	0.00%	0.00%	0.00%	-14.29%
R	Average Annual # Interactions (∑(All PLL Interactions 2008-2014)	386	32815	2919	795	5	185	92	110
S	Percent Change in Fishery ((O/R)*100)	0.26%	0.27%	0.17%	-0.13%	0.00%	0.00%	0.00%	-0.91%

Alternative B4h Conclusion
An objective of this rulemaking is to end overfishing and rebuild dusky sharks by reducing fishing mortality of dusky sharks. This area was identified as a "hotspot" in the original draft Amendment 5 analysis because at least 10 dusky shark interactions occurred within the boundaries of the hotspot closure between 2008 and 2010. However, incorporation of new data (2008 – 2014) and new analysis methodology suggest minimal reductions in dusky shark interactions before and after redistribution (-9 sharks/year), and minor beneficial fishery-wide impacts. Minor, adverse ecological impacts are anticipated for target and non-target species due to an average annual increase in effort (fishery-wide) of approximately 1,448 hooks/year after redistribution of effort. Due to the minimal reductions in dusky shark interactions achieved under this hotspot closure alternative, this alternative is not preferred at this time.

Alternative B4i: Allow conditional access to dusky shark hotspot closure areas for HMS vessels fishing with pelagic longline gear

Under Alternative B4i, NMFS would allow conditional access to dusky shark hotspot closure areas for some vessels fishing with pelagic longline gear who report or are observed interacting with the fewest dusky sharks in a year. This alternative could reduce dusky shark interactions while providing reasonable fishing opportunity to participants in the pelagic longline fleet that have demonstrated an ability to avoid dusky sharks. This approach would address the fact that, according to HMS logbook data, relatively few vessels have consistently been responsible for the majority of the dusky shark interactions. However, other alternatives, such as preferred B5, would provide training to all PLL fishermen on safe handling and release of dusky sharks. Allowing conditional access could have direct short- and long-term moderate beneficial ecological impacts, because it would provide a strong incentive to avoid dusky sharks and to reduce interactions by modifying fishing behavior. Conditional access would prohibit access to the regions where the greatest numbers of dusky shark interactions are observed to consistently occur by the vessels that have demonstrated an inability to avoid dusky sharks. Indirect ecological impacts in the short-and long-term are expected to be minor and beneficial as non-target species would also be avoided in these hotspots when they are closed. The cumulative impacts could be minor and beneficial if fishermen learn how to avoid dusky sharks to gain access to these areas, thus reducing dusky shark interactions with pelagic longline gear and subsequent incidental mortality. This alternative is not preferred because the hotspot closures do not individually, or collectively, result in large reductions in dusky shark interactions. The preferred alternatives are likely to result in more meaningful bycatch avoidance and mortality reductions across the species' range.

Alternative B4j: Implement dusky shark bycatch caps in the pelagic longline fishery

This alternative would implement bycatch caps on dusky shark interactions in hotspot areas on a three-year basis. Under this alternative, NMFS would allow pelagic longline vessels limited access to high dusky shark interaction areas with an observer onboard while limiting the number of dusky shark interactions that could occur in these areas. Once the dusky shark bycatch cap for an area is reached, that area would close until the end of the three-year bycatch cap period. This alternative would have direct short- and long-term moderate ecological impacts on dusky sharks

since this would restrict the access to high dusky shark interaction areas and close those areas if the bycatch cap is reached. In addition, increased funding sources to provide increased observer coverage to monitor dusky bycatch cap areas are unlikely. Thus, access to the hotspot areas would only be to vessels that have been selected for pelagic observer program coverage under its current selection process and when they are on a trip with an observer on board. Indirect ecological impacts in the short-and long-term are expected to be minor and beneficial as non-target species would also be avoided in these hotspots when they are closed. The cumulative impacts could be minor and beneficial if fishermen learn how to avoid dusky sharks in order to fish in the hotspot areas, thus reducing dusky shark interactions with pelagic longline gear and subsequent incidental mortality. This alternative is not preferred because the hotspot closures do not individually, or collectively, result in large reductions in dusky shark interactions. The preferred alternatives are likely to result in more meaningful bycatch avoidance and mortality reductions across the species' range.

Summary and Conclusions of Hotspot Closure Alternatives

An objective of this rulemaking is to end overfishing and rebuild dusky sharks by reducing fishing mortality of dusky sharks. The areas identified as a "hotspot" in the original draft Amendment 5 analysis contained at least 10 dusky shark interactions occurred within the boundaries of the hotspot closure between 2008 and 2010. This original definition was based on total numbers of interactions over a 3-year period; however, subsequent analyses for Amendment 7 and for this amendment encompassed more years of data and tended to result in an overall total increase in the number of dusky shark interactions per hotspot. NMFS therefore derived average annual numbers of interactions instead of utilizing total numbers of interactions to evaluate ecological impacts. To improve comparisons between each methodology, the original definition of a hotspot was refined to comprise a minimum number of annual interactions (i.e., 10 Dusky Sharks / 3 years of data = 3.33 sharks per year). Column A of Table 4.43 shows the Amendment 5 DEIS dusky shark total interactions reported in the HMS Logbook, and includes a derivation of average annual number of interactions by dividing the total by the number of years considered (i.e., 3 years, 2008 – 2010). For comparison purposes, Column B of Table 4.43 shows the total number of dusky shark interactions derived from recent analysis of HMS Logbook data (2008 – 2014, 7 years) and also includes average annual number of interactions per year in parentheses. A refined definition based on a minimum average annual number of 3.33 sharks per year suggests that one of the hotspot closures may no longer meet the definition of a hotspot (e.g. the Hatteras Shelf May hotspot closure had 3 average annual Dusky Shark interactions per year after redistribution). Therefore, it may no longer be appropriate to include this area for consideration as a hotspot closure.

The hotspot alternatives were originally developed to reduce dusky shark interactions and were based on data reported in the HMS Logbook between 2008 and 2010. The total number of dusky shark interactions (i.e., those reported as kept, discarded dead, or discarded alive) reported during this time in these areas was 1,757 interactions, and the goal was to reduce interactions by 1,090 dusky sharks. The hotspot closures proposed in the original draft Amendment 5 were estimated to reduce dusky shark interactions by 863 sharks (-49 percent), but would not meet the reduction goal of 1,090 dusky sharks.

In this document, the average annual number of dusky shark interactions calculated from the expanded logbook data set (2008–2014) across the entire fleet changed from 586 dusky sharks per year in the original draft Amendment 5 to 538 sharks/year. Applying a 42 percent reduction target, as prescribed by the 2016 update to the SEDAR 21 stock assessment, to the updated time series creates a target to reduce interactions by 246 sharks per year. Analysis of the expanded dataset (2008–2014) suggests that the average annual number of dusky shark interactions before and after redistribution of effort could result in a reduction of between 153 and 196 dusky shark interactions per year (Table 4.43). This is roughly equivalent to a reduction in dusky shark interactions in the pelagic longline fishery by 28.44 percent. Furthermore, when considering the ecological gains achieved by single closures, and the relative contribution of the pelagic longline fishery to overall dusky shark mortality, the number of dusky shark interactions reduced per year is often quite small. Two of the hotspot closures are anticipated to result in a reduction of fewer than 10 dusky shark interactions/year, and six of the hotspot closures would individually result in a reduction of fewer than 20 dusky shark interactions/year.

The hotspot closure areas are anticipated to result in some reductions of pelagic longline fleet-wide dusky shark interactions (Table 4.44). The hotspot closures that could have the greatest overall ecological impact, the Charleston Bump (May) and the Hatteras Shelf (June) hotspot closures, could result in a reduction of pelagic longline dusky shark interactions by 7.81 and 8.93 percent, respectively. The other hotspot closures considered would likely have a minimal impact on dusky shark populations as they respectively would result in fleet-wide reductions in interactions between 0.5 and 3 percent. Therefore, the hotspot closure alternatives separately could result in minor, beneficial ecological impacts on the dusky shark population. Collectively, all hotspot closures could result in an approximate 28 percent reduction in dusky shark interactions across the pelagic longline fleet, which implies potential minor to moderate beneficial ecological impact on the dusky shark population.

As discussed in Chapter 1.0, management measures implemented under Amendment 2 (e.g., sandbar shark retention prohibition, 36 large coastal shark trip limit) significantly changed how the directed BLL shark fishery operated, and have substantially reduced the numbers of dusky sharks discarded dead by BLL fishermen targeting LCS. The pelagic longline fishery is only one contributor to dusky shark fishing mortality, and while its relative contribution to total mortality is uncertain, the small reductions in interactions from these hotspot closures are not likely result in significant mortality reductions across the species' range. Since the proscribed reductions in dusky shark mortality would be met by other alternatives, and the purpose of the hotspot closures was to achieve the reduction targets presented in the 2016 update to the SEDAR 21 stock assessment, NMFS has determined that the implementation of hotspot closures is not a preferred alternative at this time.

Table 4.43 Expected average annual change in dusky shark interactions as a result of the hotspot closed areas, with and without redistribution of fishing effort. Numbers in columns C and D are rounded up to the nearest whole fish.

Alternative	Total Number of Dusky Shark Interactions per Hotspot (2008-2014) (A)	Average Annual Change in Dusky Shark Interactions Assuming No Redistribution of Fishing Effort (2008-2014) (B = A/7)	Average Annual Change in Dusky Shark Interactions Assuming Redistribution of Fishing Effort (2008-2014) (C)
Alternative B4a. Prohibit the use of pelagic longline gear in HMS fisheries in a portion of the Charleston Bump during the month of May ("Charleston Bump Hotspot May")	360 sharks	- 52 sharks/year	- 42 sharks/year
Alternative B4b. Prohibit the use of pelagic longline gear in HMS fisheries in the vicinity of the Hatteras Shelf Area during the month of May ("Hatteras Shelf Hotspot May").	50 sharks	- 8 sharks/year	- 3 sharks/year
Alternative B4c. Prohibit the use of pelagic longline gear in HMS fisheries in the vicinity of the Hatteras Shelf Area during the month of June ("Hatteras Shelf Hotspot June").	438 sharks	- 63 sharks/year	- 48 sharks/year
Alternative B4d. Prohibit the use of pelagic longline gear in HMS fisheries in the vicinity of the Hatteras Shelf Area during the month of November ("Hatteras Shelf Hotspot November").	98 sharks	- 14 sharks/year	- 14 sharks/year
Alternative B4e. Prohibit the use of pelagic longline gear in HMS fisheries in three distinct closures in the vicinity of the Mid Atlantic Bight Canyons ("Canyons Hotspot") during the month of October.	124 sharks	- 18 sharks/year	- 14 sharks/year
Alternative B4f. Prohibit the use of pelagic longline gear in HMS fisheries in an area in the vicinity of the existing Northeastern closed area during the month of July ("Southern Georges Banks Hotspot July").	131 sharks	- 19 sharks/year	- 13 sharks/year
Alternative B4g. Prohibit the use of pelagic longline gear in HMS fisheries in an area in the vicinity of the existing Northeastern closed area during the month of August ("Southern Georges Banks Hotspot August").	85 sharks	- 13 sharks/year	- 10 sharks/year

Alternative	Total Number of Dusky Shark Interactions per Hotspot (2008-2014) (A)	Average Annual Change in Dusky Shark Interactions Assuming No Redistribution of Fishing Effort (2008-2014) (B = A/7)	Average Annual Change in Dusky Shark Interactions Assuming Redistribution of Fishing Effort (2008-2014) (C)
Alternative B4h. Prohibit the use of pelagic longline gear in HMS fisheries in a portion of the Charleston Bump during the month of November ("Charleston Bump Hotspot November").	62 sharks	- 9 sharks/year	- 9 sharks/year
Total	1,348 sharks	- 196 sharks/year	- 153 sharks/year

Table 4.44 Estimated annual change (average annual change per year and percent change), after redistribution, in dusky shark interactions and effort (# hooks) from hotspot closure alternatives.

Alternative	Hotspot Location	Estimated Annual Change (# Dusky / yr)	Annual Estimated Change In # Dusky Discarded		Estimated Annual Change in Effort (# Hooks)	Annual Estimated Change in # Hooks Fished	
			Local (Within Hotspot)	Fishery-Wide		Local (Within Hotspot)	Fishery-Wide
Alt. B4a	Charleston Bump (May)	-42	-46.15%	-7.81%	-39,633	-12.38%	-0.59%
Alt. B4b	Hatteras Shelf (May)	-3	-2.84%	-0.56%	-53,264	-9.18%	-0.79%
Alt. B4c	Hatteras Shelf (June)	-48	-45.29%	-8.93%	-34,159	-5.89%	-0.50%
Alt. B4d	Hatteras Shelf (Nov)	-14	-13.21%	-2.61%	-13,450	-2.32%	-0.20%
Alt. B4e	Mid-Atlantic Canyons (Oct)	-14	-40.00%	-2.60%	-32,567	-8.23%	-0.48%
Alt. B4f	Southern Georges Bank (July)	-13	-29.55%	-2.42%	-47,831	-14.06%	-0.71%
Alt. B4g	Southern Georges Bank (Aug)	-10	-22.73%	-1.86%	-25,599	-7.53%	-0.38%
Alt. B4h	Charleston Bump (Nov)	-9	-17.31%	-1.67%	1,448	1.04%	0.02%
	Totals	**-153**		**-28.44%**	**-245,055**		**-3.62%**
	Average Annual # Dusky Interactions: 538 Average Annual # Hooks Deployed: 6,764,456						

Alternative B5– Preferred Alternative
Under preferred Alternative B5, NMFS would require completion of shark identification and fishing regulation training as part of the Safe Handling and Release Workshop for all HMS pelagic longline, bottom longline, and shark gillnet vessel owners and operators. This would result in consistent training across all HMS fisheries that interact with dusky sharks in U.S. waters on how to accurately identify and report dusky shark catches, avoid bycatch, and improve safe handling and release so that discard mortality rates are minimized when interactions occur. HMS vessels owners and operators are required to participant in the safe handling and release workshop every three years. This alternative would have short-term, direct neutral ecological impacts since HMS pelagic longline, bottom longline, and shark gillnet vessels owners and operators would be required to take the Safe Handling and Release Workshop along with the shark identification and fishing regulation training every year. Thus, dusky shark interactions and discards would still occur until all of the HMS vessel owners and operators required to attend the Workshops actually attend additional training as part of the three-year renewal and subsequently modify fishing behavior. However, in the long-term, the direct impacts could become moderate and beneficial if these vessel owners and operators learn how to avoid dusky sharks and how to maximize the potential for survival of any dusky sharks they accidentally caught. The indirect ecological impacts in the short-and long-term are expected to be neutral as the training would be specific to dusky sharks. The cumulative impacts could be moderate and beneficial if fishermen learn how to avoid dusky sharks in other fisheries that they participate in as well as when fishing in HMS fisheries.

Alternative B6– Preferred Alternative
Under the preferred Alternative B6, NMFS would develop additional outreach materials for commercial fisheries regarding shark identification, and require that all vessels with an Atlantic shark limited access permit and fishing with pelagic longline, bottom longline, and gillnet gears to abide by a dusky shark fleet communication and relocation protocol. The protocol would require vessels to report the location of dusky shark interactions over the radio to other vessels in the area and that subsequent fishing sets on that fishing trip could be no closer than 1 nautical mile (nm) from where the encounter took place. Providing all commercial HMS fleets with more information regarding dusky shark locations, anywhere within U.S. waters, and avoiding areas and conditions where dusky sharks have been should reduce dusky shark bycatch. Outreach materials, in addition to the training that would be received under Alternative B5, is expected to reduce the discard mortality rates of accidentally caught dusky sharks. This additional awareness from enhanced outreach methods and the fleet communication and relocation protocol would have direct short- and long-term minor beneficial ecological impacts as it would help reduce bycatch of dusky sharks. Indirect short- and long-term impacts are expected to be neutral, assuming that relocating fishing based on dusky shark interactions would not change the level of target catch or bycatch of other species. Cumulative impacts could be minor and beneficial if fishermen apply similar bycatch avoidance techniques to other fisheries that they participate in. Since increased outreach materials and fleet communication and relocation protocol could help reduce dusky shark bycatch, NMFS prefers this alternative at this time.

Alternative B7
In Alternative B7, NMFS would request the states (Virginia, Maryland, Delaware, and New Jersey) and/or ASMFC to consider extending the shark commercial seasonal closure from July

15 to July 31 to offer additional protection for dusky sharks in nursery areas. Currently, NMFS has a Mid-Atlantic shark time/area closure off North Carolina, an area which serves as nursery and pupping areas for sandbar and dusky sharks. The area is closed to vessels using bottom longline gear from January 1 to July 31 each year. If the states and/or ASMFC extend the state closures to July 31, it would prevent fishermen from using bottom longline during this time and provides additional protection for dusky sharks along with other juvenile sharks in nursery areas as is the goal of the seasonal commercial closure. Thus, this alternative would have direct short- and long-term minor beneficial ecological impacts. Minor, beneficial indirect impacts on other species in the short- and long-term would likely occur with the extension of this closure, as commercial fishing effort would be reduced. Cumulative impacts most likely would be neutral as the reduction in fishing effort associated with extending the closure would unlikely make a substantial impact on the ecosystem as a whole.

Alternative B8
Under Alternative B8, NMFS would prohibit the use of pelagic longline as an authorized gear for Atlantic HMS in the Atlantic, Gulf of Mexico, and Caribbean to reduce bycatch of dusky sharks. The overall number of dusky sharks reported in the HMS Logbook as dead discards on pelagic longline gear has averaged around 66 dusky sharks per year from 2003-2014 (Table 4.45). Therefore, the direct short-term ecological impacts of Alternative B8 are expected to be minor and beneficial whereas the long-term direct ecological impacts may be more moderate and beneficial as the continued lack of dusky shark mortality from pelagic longline gear would allow more dusky sharks to reach maturity and reproduce.

The indirect impacts to other species are likely to be major and beneficial, as pelagic longline gear is one of the primary gears for HMS (Table 4.45). For instance, there are high numbers of pelagic sharks and LCS that are discarded on pelagic longline gear whereas a smaller number are retained. Pelagic longline gear is also the primary gear for BAYS tunas and swordfish and is used to incidentally harvest bluefin tuna. High numbers of marlins are also discarded on this gear, and this gear is also used for non-HMS, such as dolphin and wahoo (Table 4.45). For those species, indirect impacts for these species in the short- and long-term would be major and beneficial given the high number of some HMS that are both kept and discarded from pelagic longline gear.

The cumulative ecological impacts of Alternative B8 would be major and beneficial as large numbers of HMS and non-HMS, including protected resources such as sea turtles and marine mammals, would no longer interact with this gear type in HMS fisheries. However, this would also eliminate the predominant directed fisheries for swordfish and BAYS tunas in the Atlantic, which would affect both U.S. landings of many HMS species (Table 4.46) and ultimately U.S. allocation of these quotas. Loss of U.S. quotas, which are harvested under more conservation minded regulations compared to many other nations, would likely have moderate adverse cumulative ecological impacts.

Alternative B9 – Preferred Alternative
Under Alternative B9, a preferred alternative, NMFS would require fishermen with an Atlantic shark directed limited access permit to use circle hooks when fishing with bottom longline gear. As described in Chapter 2.0, the majority of the Atlantic shark directed limited access permit

holders already are required to use circle hooks since they fish with pelagic longline gear or use circle hooks with bottom longline gear. This alternative would have short- and long-term, direct minor beneficial ecological impacts since research suggests that circle hooks reduce shark at-vessel and post-release mortality rates without reducing catchability compared to J-hooks. Based on research using pelagic longline gear, circle hooks were determined not to affect catch rates of sharks, but do reduce mortality. Willey et al. (2016) found that 3 percent of sharks caught recreationally with circle hooks were deep hooked while 6 percent caught on J-hooks were deep hooked. Campana et al. (2009) observed that 96 percent of sharks that were deep hooked were severely injured or dead while 97 percent of sharks that were hooked superficially (mouth or jaw) were released healthy and with no apparent trauma. As deep hooked sharks are more likely to die, Willey et al.'s (2016) results indicate circle hooks could reduce mortality of recreationally-caught sharks by approximately 48 percent (i.e., a 50 percent reduction from 96 percent deep hooked sharks). The short- and long-term indirect impacts to other species are likely to be moderate beneficial, as circle hooks are known to decrease post release mortality over J hooks for a variety of HMS and non-HMS, including protected resources such as sea turtles and marine mammals. Approximately 25 percent of bottom longline vessels do not currently solely use circle hooks, so additional benefits to dusky shark mortality would be achieved by these vessels switching to circle hooks.

Table 4.45 Reported Catch (Number of Fish) in the U.S. Atlantic Pelagic Longline Fishery (2006-2015). Source: HMS Logbook

Species	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Swordfish kept	38,241	45,933	42,800	45,378	33,831	38,721	51,544	44,556	32,908	27,730
Swordfish discarded	8,900	11,823	11,194	7,484	6,107	8,736	7,996	4,756	4,655	5,382
Blue marlin discarded	439	611	687	1,013	504	544	896	844	718	990
White marlin discarded	557	744	670	1,064	605	943	1,432	1,239	1,580	2,855
Sailfish discarded	277	321	506	774	312	581	795	456	445	715
Spearfish discarded	142	147	197	335	212	281	270	342	306	837
Bluefin tuna kept	261	337	343	629	392	347	392	273	379	320
Bluefin tuna discarded	833	1,345	1,417	1,290	1,488	765	563	266	390	210
Bigeye, albacore, yellowfin, and skipjack tunas kept	73,058	70,390	50,108	57,461	51,786	69,504	84,707	67,083	73,339	54,734
Pelagic sharks kept	2,098	3,504	3,500	3,060	3,872	3,732	2,794	3,384	3,804	2,208
Pelagic sharks discarded	24,113	27,478	28,786	33,721	45,511	43,806	23,038	28,151	38,496	45,082
Large coastal sharks kept	1,768	546	115	403	434	131	86	49	47	50
Large coastal sharks discarded	5,326	7,133	6,732	6,672	6,726	6,351	7,716	7,997	5,905	8,839
Dolphin kept	25,658	68,124	43,511	62,701	30,454	30,054	42,445	34,250	63,217	53,526
Wahoo kept	3,608	3,073	2,571	2,648	749	1,922	3,121	2,721	3,325	1,563
Sea turtle interactions	128	300	476	137	94	66	61	92	93	357
Number of Hooks(×1k)	5,662	6,291	6,498	6,979	5,729	6,035	7,679	7,306	7,125	5,856

Table 4.46 Reported Landings (mt ww) in the U.S. Atlantic Pelagic Longline Fishery (2006-2014). Source: NMFS 2015.

Species	2006	2007	2008	2009	2010	2011	2012	2013	2014
Yellowfin tuna	2,009.9	2,394.5	1,324.5	1,700.1	1,188.8	1,458.3	2,269.6	1,544.4	1,456.2
Skipjack tuna	0.2	0.02	1.45	0.5	1.4	0.6	0.4	0.5	0.31
Bigeye tuna	520.6	380.7	407.7	430.1	443.2	600.2	581.4	508.9	586.7
Bluefin tuna*	204.6	164.3	232.6	335.0	238.7	241.4	295.4	190.4	221.9
Albacore tuna	102.9	126.8	126.5	158.3	159.9	240.0	261.2	255.3	309.6
Swordfish N.*	1,960.8	2,474.0	2,353.6	2,691.3	2,206.5	2,570.9	3,346.6	2,812.1	1,832.3
Swordfish S.*	0.0	0.0	0.0	0.0	0.3	0.0	0.0	0.06	0.0

* Includes landings and estimated discards from scientific observer and logbook sampling programs. Source: NMFS, 2015.

Alternative B10
Under Alternative B10, NMFS would implement IDQs for commercial pelagic and bottom longline fisheries. NMFS would annually allocate a certain number of dusky shark interactions to each shark directed or incidental limited access permit holder and those vessels would no longer be authorized to fish for HMS for the remainder of the year once their individual dusky shark bycatch cap was reached. Because the stock assessment used a catch-free model, and because dusky sharks have been a prohibited species for so long and little catch data is available, NMFS does not have a supportable estimate to use at this time to calculate an appropriate, scientifically-supportable number for how many dusky sharks could appropriately be retained and how much of that bycatch quota should be allocated to each vessel would be allocated. NMFS would need to extrapolate the current observer data to the entire fleet. As noted in SEDAR 21, the stock assessment scientists used a catch-free model in part because of the high degree of uncertainty in reported catches or catches are not reported at all. Given the mortality reductions needed, any such estimate would then need to be reduced in order to end overfishing. Thus, NMFS expects the allocations to each vessel may be extremely low and highly inaccurate.

Additionally, this approach would require electronic monitoring to document dusky shark interactions, and this technology is not yet advanced enough to accurately identify shark species in the water, which is where most sharks are currently released in an effort to decrease mortality. This means that vessel owners would be required to bring all sharks, including dusky sharks, onboard the vessel to ensure that an accurate picture of identifying features is taken by the cameras. Such handling would likely increase dusky shark and other shark species mortality, contrary to the needs and objectives of this amendment. Recent research indicates that even short time periods out of the water can result in significantly high mortality rates (J. Graves, VIMS, pers. comm., 2016). While this research was conducted on billfish, it is reasonable to assume the same mortality rates would apply to dusky sharks, particularly since those sharks would likely have been caught on the gear for several hours before being handled and then brought out of the water.

Because of this handling mortality, this alternative would have short- and long-term, direct moderate adverse ecological impacts since every shark would need to be brought on board the vessel. Additionally, given the high uncertainty in dusky shark catches, calculating the overall and individual bycatch caps would not be accurate so there is a high degree of uncertainty that the calculated IDQ would be appropriate to reduce mortality even if the handling mortality were correctly accounted for. Indirect short- and long-term impacts are expected to be neutral, assuming that fishermen change their fishing habits to avoid dusky shark interactions and that relocating fishing would not change the level of target catch or bycatch of other species. Cumulative impacts could be minor and adverse if fishermen cannot avoid dusky sharks and are required to bring the sharks on board the vessel to ensure an accurate identification of the sharks. Since technology is not yet sufficient to accurately identify shark species in the water and the likelihood for increase dusky shark mortality, NMFS does not prefer this alternative at this time.

4.2 Impacts on Essential Fish Habitat

Pursuant to 16 U.S.C. 1855(b)(1), and as implemented by 50 C.F.R. §800. 815, the Magnuson-Stevens Act requires NMFS to identify and describe essential fish habitat (EFH) for each life stage of managed species and to evaluate the potential adverse effects of fishing activities on EFH including the cumulative effects of multiple fisheries activities. If NMFS determines that fishing gears are having an adverse effect on HMS EFH, or other species' EFH, then NMFS must include management measures that minimize adverse effects to the extent practicable. Ecological impacts to EFH due to actions in this proposed amendment would likely be neutral and have no adverse effects as the preferred alternatives (modifying the recreational permitting process, requiring the use of circle hooks when fishing recreationally for shark, establishing protocols for releasing sharks, and additional outreach and educational training programs) would not have any impact on EFH.

In the 2006 Consolidated HMS FMP and Amendment 1 to the 2006 Consolidated HMS FMP, NMFS reviewed the various gear types with the potential to affect EFH and, based on the best information available at that time, NMFS determined that fishing sharks is not likely to adversely affect EFH. Gears commonly used that would be impacted by this action include pelagic longline, and rod and reel gear. Amendment 1 to the 2006 Consolidated HMS FMP analyzed EFH impacts resulting from these gear types. Amendment 1 found that pelagic longline and rod and reel gear do not typically interact with the sea floor; therefore, these gear types are unlikely to impact EFH. The HMS EFH Final Five-Year Review analyzed Atlantic HMS fishing gear impacts on EFH and Draft Amendment 10, and found no new information that pelagic longline and rod and reel gear would have negative impacts on EFH (NMFS 2015; NMFS 2016). Certain fishing gears can have negative effects on essential fish habitat and Amendment 5b measures are not expected to change the fishing gears authorized relative to the status quo. Thus, there is no evidence to suggest that implementing any of the preferred alternatives in this amendment would adversely affect EFH.

4.3 Impacts on Protected Resources

This section contains a discussion of the expected protected resources impacts from each of the analyzed alternatives for the recreational and commercial fisheries. In this section, references to bycatch only refer to protected resources interactions, unless otherwise specified.

Alternative A1
Alternative A1 would not implement any management measures in the recreational shark fishery to decrease mortality of dusky sharks. Therefore, the direct and indirect impacts on protected resources would be neutral in the short- and long-term, as there would be no increase or decrease in fishing effort and consequently, no changes in bycatch or bycatch rates of protected resources are expected in in the recreational shark fisheries. The cumulative impacts on protected resources are expected to neutral as well given there would be no change in fishing effort or in bycatch rates for protected resources.

Alternative A2– Preferred Alternative
Under Alternative A2, recreational fishermen targeting sharks must obtain a shark endorsement in addition to other permit requirements. This alternative is not expected to reduce the overall number of recreational shark fishermen. Recreational fishermen typically use rod and reel gear which rarely interacts with protected resources and the gear is actively managed and non-target species are usually released quickly in a manner that maximizes the chance for survival. Thus, direct and indirect impacts on protected resources would be neutral in the short- and long-term. The cumulative impacts on protected resources are expected to neutral as well given the limited interactions with rod and reel gear.

Alternative A3
Alternative A3 would require participants in the recreational shark fishery to carry an approved shark identification placard on board the vessel when fishing for sharks. This alternative is not expected to reduce the overall number of recreational shark fishermen. Recreational fishermen typically use rod and reel gear which rarely interacts with protected resources and the gear is actively managed and non-target species are usually released quickly in a manner that maximizes the chance for survival. Thus, direct and indirect impacts on protected resources would be neutral in the short- and long-term. The cumulative impacts on protected resources are expected to neutral as well given there would be no change in fishing effort or in bycatch rates and due to the limited interactions with rod and reel gear.

Alternative A4
Under Alternative A4, NMFS would extend the prohibition on retention of ridgeback sharks for HMS Angling and Charter/Headboat permit holders to include oceanic whitetip, tiger sharks, and smoothhound sharks. This alternative is not expected to reduce the overall number of recreational shark fishermen. Recreational fishermen typically use rod and reel gear which rarely interacts with protected resources and the gear is actively managed and non-target species are usually released quickly in a manner that maximizes the chance for survival. Thus, direct and indirect impacts on protected resources would be neutral in the short- and long-term. The cumulative impacts on protected resources are expected to neutral as well given there would be no change in fishing effort or in bycatch rates and due to the limited interactions with rod and reel gear.

Alternative A5
Under Alternative A5, the minimum recreational size limit for authorized shark species, except for Atlantic sharpnose, bonnethead, and hammerhead (great, scalloped, and smooth) sharks, would increase from 54 to 89 inches FL. This alternative is not expected to reduce the overall number of recreational shark fishermen. Recreational fishermen typically use rod and reel gear which rarely interacts with protected resources and the gear is actively managed and non-target species are usually released quickly in a manner that maximizes the chance for survival. Thus, direct and indirect impacts on protected resources would be neutral in the short- and long-term. The cumulative impacts on protected resources are expected to neutral as well given there would be no change in fishing effort or in bycatch rates and due to the limited interactions with rod and reel gear.

Alternative A6 – Circle Hook Alternatives

Alternative A6a– Preferred Alternative
Under preferred Alternative A6a, circle hooks would be required for all HMS Angling and Charter/Headboat permit holders with a shark endorsement when fishing for sharks recreationally, i.e., when deploying natural bait while using a wire or heavy (200 lb test or greater) monofilament or fluorocarbon leader. Circle hooks would also be required for all Atlantic HMS permit holders participating in fishing tournaments that bestow points, prizes, or awards for sharks would have to use circle hooks when deploying natural baits. This alternative is not expected to reduce the overall number of recreational shark fishermen. Recreational fishermen and those participating in tournaments typically use rod and reel gear which rarely interacts with protected resources and the gear is actively managed and non-target species are usually released quickly in a manner that maximizes the chance for survival. Thus, direct and indirect impacts on protected resources would be neutral in the short- and long-term. The cumulative impacts on protected resources are expected to neutral as well given there would be no change in fishing effort or in bycatch rates and due to the limited interactions with rod and reel gear.

Alternative A6b
Under Alternative A6b, circle hooks would be required for all HMS Angling and Charter/Headboat permit holders with a shark endorsement when fishing for sharks recreationally, when deploying natural bait while using a 5/0 or larger hook size. All Atlantic HMS permit holders participating in fishing tournaments that bestow points, prizes, or awards for sharks would have to use circle hooks when deploying natural baits. This alternative is not expected to reduce the overall number of recreational shark fishermen. Recreational fishermen and those participating in tournaments typically use rod and reel gear which rarely interacts with protected resources and the gear is actively managed and non-target species are usually released quickly in a manner that maximizes the chance for survival. Thus, direct and indirect impacts on protected resources would be neutral in the short- and long-term. The cumulative impacts on protected resources are expected to neutral as well given there would be no change in fishing effort or in bycatch rates and due to the limited interactions with rod and reel gear.

Alternative A6c
Under Alternative A6a, circle hooks would be required for all Atlantic HMS permit holders participating in fishing tournaments that bestow points, prizes, or awards for sharks. This alternative is not expected to reduce the overall number of recreational shark fishermen. Recreational fishermen and those participating in tournaments typically use rod and reel gear which rarely interacts with protected resources and the gear is actively managed and non-target species are usually released quickly in a manner that maximizes the chance for survival. Thus, direct and indirect impacts on protected resources would be neutral in the short- and long-term. The cumulative impacts on protected resources are expected to neutral as well given there would be no change in fishing effort or in bycatch rates for protected resources and due to the limited interactions with rod and reel gear.

Alternative A7
Under Alternative A7 all permit holders fishing recreationally for sharks would be prohibited from retaining any shark species. Most commonly, this requirement would apply to HMS Angling and Charter/Headboat permit holders; however, this requirement would also apply to Atlantic tunas General category and Swordfish General commercial permit holders participating in registered HMS fishing tournaments and recreationally fishing for sharks. However, such permit holders may still fish for and target authorized shark species, though retaining any shark species would be prohibited (i.e., catch and release). This alternative may reduce the overall number of recreational shark fishermen. Recreational fishermen typically use rod and reel gear which rarely interacts with protected resources and the gear is actively managed and non-target species are usually released quickly in a manner that maximizes the chance for survival. Thus, direct and indirect impacts on protected resources would be neutral in the short- and long-term. The cumulative impacts on protected resources are expected to neutral as well given recreational fishing would still occur even if anglers could not retain sharks. No change in bycatch rates for protected resources are expected under this alternative.

Alternative B1
Alternative B1, the status quo alternative, would not implement any management measures in the pelagic longline fishery to decrease mortality of dusky sharks. Under Alternative B1, commercial measures for using pelagic longline gear that catch dusky sharks as bycatch would remain the same; thus, impacts direct and indirect impacts in the short and long term on protected resources would be neutral. Given fishing effort would likely not change, cumulative impacts on protected resources are also expected to neutral.

Alternative B2
Under Alternative B2, participants holding an Atlantic shark limited access commercial permit (directed or incidental) with pelagic longline gear onboard would be limited to 750 hooks per pelagic longline set, with no more than 800 assembled gangions onboard at any time. Fishermen could have extra components to assemble gangions (e.g., hooks, clips, monofilament line) onboard, as long as the number of assembled gangions does not exceed 800. Capping the number of hooks that can be deployed on pelagic longline gear would be expected to result in direct and indirect minor beneficial impacts on protected resources in the short- and long-term since the rate of interactions may decrease if fishermen do not increase their effort to offset the limits on the number of hooks per set. Cumulative impacts on protected resources are also expected to be minor and beneficial if the number of interactions of gear with protected resources decreases due to a decrease in the number of hooks fished.

Alternative B3– Preferred Alternative
Under preferred Alternative B3, NMFS would require Atlantic shark commercial limited access permit holders (directed or incidental) fishing with pelagic longline gear to release all sharks that are not being boarded or retained by using a dehooker, or by cutting the gangion no more than three feet from the hook. It is unlikely that this measure would have any impact on protected resources since it specifically applies to sharks. Thus, direct and indirect impacts to protected resources would be neutral in the short- and long-term. Similarly, cumulative impacts on protected resources are also expected to neutral.

Alternative B4
The primary goal of the hotspot closures for pelagic longline gear considered in Alternative 4 is to reduce interactions with dusky sharks. Alternative B4 would establish hotspot closed areas based where high levels of dusky shark interactions were reported in the HMS logbook from 2008-2014. These hotspots were chosen because they contained a high number of dusky shark interactions reported from the HMS logbook. The hotspot closed areas would attempt to maximize the reduction in dusky shark interactions while minimizing impacts to target species or other bycatch, including protected resources. By limiting the size and duration of these hotspot closed area, negative ecological impacts would be minimized because it is assumed that fishing effort would be redistributed to adjacent areas. With respect to ecological impacts, the hotspot closed areas were analyzed separately to identify potential effects with and without redistribution. The cumulative impact of combining the eight hotspot closed areas for pelagic longline gear under Alternative B4 would help reach targeted reductions of dusky shark within the pelagic longline fishery. Cumulative effects of the hotspot closed areas on protected resources are likely to be neutral to minor beneficial in the short- and long-term as effort is expected to redistribute to open area.

Alternative B4a
Alternative B4a would prohibit the use of pelagic longline gear in HMS fisheries in a portion of the Charleston Bump during the month of May ("Charleston Bump Hotspot May"). Redistribution analysis predicts that direct and indirect, minor, ecological benefits for protected resources are expected in the short and long-term because interactions with loggerhead and leatherback sea turtles would both be reduced by 1 turtle. Cumulative impacts on protected resources are also expected to be minor and beneficial if the number of interactions with protected resources declines.

Alternative B4b
Alternative B4b would prohibit the use of pelagic longline gear in HMS fisheries in the vicinity of the Cape Hatteras Special Research/Hatteras Shelf Area during the month of May ("Hatteras Shelf Hotspot May"). Redistribution analysis predicts that direct and indirect, minor ecological benefits for protected resources are expected because interactions with loggerhead and leatherback sea turtles would both be reduced by 1 turtle. Cumulative impacts on protected resources are also expected to be minor and beneficial if the number of interactions with protected resources declines.

Alternative B4c
Alternative B4c would prohibit the use of pelagic longline gear in HMS fisheries in the vicinity of the Cape Hatteras Special Research/Hatteras Shelf Area during the month of June ("Hatteras Shelf Hotspot June"). Redistribution analysis predicts that direct and indirect, minor, ecological benefits for protected resources are expected because interactions with loggerhead sea turtles would be reduced by 1 turtle and remain unchanged for leatherback sea turtles. Cumulative impacts on protected resources are also expected to be minor and beneficial if the number of interactions with protected resources declines.

Alternative B4d
Alternative B4d would prohibit the use of pelagic longline gear in HMS fisheries in the vicinity of the Cape Hatteras Special Research/Hatteras Shelf Area during the month of November ("Hatteras Shelf Hotspot November"). Redistribution analysis predicts that the direct and indirect ecological impacts on leatherback and loggerhead sea turtles would be neutral as interactions with these protected species would remain the same after redistribution of fishing effort. Cumulative impacts on protected resources are also expected to neutral if the number of interactions with protected resources does not change.

Alternative B4e
Alternative B4e would prohibit the use of pelagic longline gear in HMS fisheries in three distinct closures in the vicinity of the Mid Atlantic Bight Canyons ("Canyons Hotspot") during the month of October. Redistribution analysis predicts that direct and indirect, minor, short- and long-term benefits for protected resources are expected because interactions with loggerhead and leatherback sea turtles would both be reduced by 1 turtle. Cumulative impacts on protected resources are also expected to be minor and beneficial if the number of interactions with protected resources declines.

Alternative B4f
Alternative B4f would prohibit the use of pelagic longline gear in HMS fisheries in an area in the vicinity of the existing Northeastern closed area during the month of July ("Southern Georges Banks Hotspot July"). Direct and indirect, minor, short- and long-term beneficial ecological benefits for loggerhead and leatherback sea turtles are expected. Interactions with leatherback and loggerhead sea turtles would decrease by 5 and 4 turtles, respectively. Cumulative impacts on protected resources are also expected to be minor and beneficial if the number of interactions with protected resources declines.

Alternative B4g
Alternative B4g would prohibit the use of pelagic longline gear in HMS fisheries in an area in the vicinity of the existing Northeastern closed area during the month of August ("Southern Georges Banks Hotspot August"). Direct and indirect, minor, short- and long-term beneficial ecological benefits for loggerhead and leatherback sea turtles are expected. Interactions with both loggerhead (-6 turtles, fishery-wide) and leatherback (-1 turtles, fishery-wide) sea turtles would decrease if the hotspot closed area were closed in August and fishing effort were redistributed to open areas of the NEC statistical reporting area. Cumulative impacts on protected resources are also expected to be minor and beneficial if the number of interactions with protected resources declines.

Alternative B4h
Alternative B4h would prohibit the use of pelagic longline gear in HMS fisheries in a portion of the Charleston Bump during the month of November ("Charleston Bump Hotspot November"). Redistribution analysis predicts that direct and indirect, minor, ecological benefits for protected resources are expected in the short- and long-term because interactions with loggerhead and leatherback sea turtles would both be reduced by 1 turtle. Cumulative impacts on protected resources are also expected to be minor and beneficial if the number of interactions with protected resources declines.

Alternative B4i
Alternative B4i would allow fishermen who report or are observed interacting with the fewest number of dusky sharks in a year access to fish in dusky hotspot closures with an observer onboard. Allowing a restricted number of fishermen into these dusky hotspots is not expected to change the interaction rate with protected resources; interactions with protected resources are expected to be similar to conditions under the status quo. Thus, direct and indirect impacts on protected resources are expected to be neutral in the short- and long-term. Cumulative impacts on protected resources are also expected to neutral if the number of interactions with protected resources is expected to be similar to conditions under the status quo.

Alternative B4j
Alternative B4j would establish a dusky bycatch cap for each hotspot area on a three-year basis. Once the bycatch cap is reached, the hotspot would be closed to pelagic longline fishing. The impacts on protected resources would depend on how much effort is re-distributed to open areas; however, as most re-distributed effort from the hotspot closures could result in direct, minor, ecological benefits for protected resources in the short and long-term, it is expected that the cumulative impact of this alternative on protected resources would also have direct and indirect, minor ecological benefits in the short and long term as the interactions with sea turtles are expected to decline when pelagic longline fishermen leave these particular hotpot areas. Cumulative impacts on protected resources are also expected to be minor and beneficial if the number of interactions with protected resources declines.

Alternative B5– Preferred Alternative
Preferred Alternative B5 would provide additional training for all HMS pelagic longline, bottom longline, and shark gillnet vessel owners and operators in a new portion of the Safe Handling and Release Workshop curriculum that would focus on prohibited shark species identification, safe handling and release practices, reporting, and compliance when they renew this training. It is unlikely that this measure would have any impact on protected resources since it specifically applies to sharks. Thus, direct and indirect impacts to protected resources would be neutral in the short- and long-term. Cumulative impacts on protected resources are also expected to neutral if the number of interactions with protected resources is expected to be similar to conditions under the status quo.

Alternative B6– Preferred Alternative
Under preferred Alternative B6, NMFS would develop additional outreach materials for commercial fisheries regarding shark identification, and regulations that would focus on dusky sharks. Alternative B6 would require that all vessels with an Atlantic shark limited access commercial permit abide by a dusky shark fleet communication and relocation protocol. It is unlikely that this measure would have any impact on protected resources since it specifically applies to sharks. Thus, direct and indirect impacts to protected resources would be neutral in the short- and long-term. Cumulative impacts on protected resources are also expected to neutral if the number of interactions with protected resources is expected to be similar to conditions under the status quo.

Alternative B7
Alternative B7 would request that states extend the timing of their existing mid-Atlantic shark closed area by two weeks. The purpose of this modification would be to offer additional protection for dusky sharks in nursery areas. The direct and indirect impacts on protected resources in the short and long-term would be neutral because there would minimal change in the fishing effort in the shark fisheries in this area and the increase in overall duration of the closure would be minor. Cumulative impacts on protected resources are also expected to neutral if the number of interactions with protected resources does not change.

Alternative B8
Alternative B8 would prohibit the use of pelagic longline gear in Atlantic HMS fisheries. Prohibiting the use of pelagic longline gear would likely result in indirect and direct, major beneficial ecological impacts on protected species in the short- and long-term. Based on HMS logbook data (2008-2014), the complete closure of the pelagic longline fishery would result in a greatly reduced number of sea turtles being taken. However, any ecological benefits may be lost if ICCAT reallocates U.S. quota to other countries that may not implement comparable bycatch reduction measures as the United States, which could result in cumulative moderate adverse impacts on protected resources.

Alternative B9 – Preferred Alternative
Preferred Alternative B9 would require all HMS directed shark permit holders using bottom longline gear to only use circle hooks. The short- and long-term direct and indirect impacts to protected resources are likely to be moderate and beneficial, as circle hooks are known to increase post-release survival over J hooks for a variety of protected resources such as sea turtles and marine mammals. Cumulative impacts on protected resources are also expected to be moderate and beneficial due increased post-release survival associated with circle hooks.

Alternative B10
Under Alternative B10, NMFS would implement IDQs for commercial pelagic and bottom longline fisheries. Alternative B6 would annually allocate a certain number of dusky shark interactions to each shark directed or incidental limited access permit holder. Once their individual dusky shark bycatch cap was reached, those vessels would no longer be authorized to fish for HMS for the remainder of the year. The impacts to protected species under this alternative would depend upon the amount of fishing effort by shark directed or incidental limited access permit holders and whether or not individual vessels reach their IDQs. The amount of total fishing effort and the amount of protected species catch would depend upon the each vessel's individual dusky shark bycatch quota. If the IDQs have the effect of reducing fishing effort, due to the constraining effect of the dusky shark bycatch quota on some vessels, the amount of protected species catch could be reduced. Thus, direct and indirect impacts to protected resources would be minor beneficial in the short- and long-term. Cumulative impacts on protected resources are also expected to minor beneficial if the number of interactions with protected resources is correlated to fishing effort.

4.4 Economic and Social Evaluation

This chapter assesses the economic impacts of the alternatives presented in this document. The primary purpose of this chapter is to provide the baseline economic data and economic impact analysis for the Regulatory Impact Review (RIR) in Chapter 6.0 and the Initial regulatory Flexibility Analysis (IRFA) in Chapter 7.0. It also provides relevant data for Community Profiles described in Chapter 8.0. While this chapter provides an economic analysis, it is not a stand-alone analysis as it refers back to, provides background data for, and builds upon the specific data and analyses provided in Chapters 3.0 and 9.0.

In this rulemaking, NMFS considered a range of alternatives within two different categories to address dusky shark overfishing and meet the objectives of the proposed action. The first category covers seven main alternatives that address a range of measures to reduce dusky shark bycatch mortality in the recreational fishery. The second category of alternatives involves nine main alternatives and several sub-alternatives to reduce dusky shark bycatch mortality in the commercial fisheries. The expected economic impacts of the different alternatives considered and analyzed are discussed below.

4.4.1 Recreational Alternatives

Alternative A1
Alternative A1, the no action alternative, would not implement any management measures in the recreational shark fishery to decrease mortality of dusky sharks, likely resulting in direct, short- and long-term neutral economic impacts. Since there would be no changes to the fishing requirements, there would be no short-term adverse direct or indirect socioeconomic impacts. However, overfishing would continue under this alternative, thus, NMFS does not prefer this alternative at this time. If more restrictive measures are required in the long-term under MSA or other statutes such as the Endangered Species Act, long-term direct moderate adverse socioeconomic impacts may occur.

Indirect socioeconomic impacts from this alternative would likely be neutral in the short- and long-term. Indirect socioeconomic impacts include impacts on supporting businesses such as bait and tackle suppliers, marinas, and the hospitality industry in coastal towns. Since dusky sharks are a prohibited species, it is unlikely that any recreational angler plans trips around the availability of the species, thus, supporting businesses are unlikely to be impacted. Cumulative impacts are expected to be neutral to moderate adverse if overfishing continues and NMFS had to implement more restrictive measures to end overfishing and rebuild dusky sharks.

Alternative A2 – Preferred Alternative
Under Alternative A2, HMS permit holders that want to fish recreationally for sharks would be required to obtain a "shark endorsement" from NMFS as a permit condition. Most commonly, this requirement would apply to HMS Angling and HMS Charter/Headboat permit holders with a shark endorsement since they are the most likely to be fishing recreationally. However, Atlantic tunas General category and Swordfish General Commercial permit holders would also be able to obtain a shark endorsement to allow them to participate in registered HMS fishing tournaments

and recreationally fish for sharks. Obtaining the shark endorsement would be included in the annual HMS Angling, Charter/Headboat, General category, and Swordfish General Commercial permit application or annual renewal process. An online quiz, administered during the application or renewal process, would be required in order to obtain the shark endorsement. This online quiz would likely focus on identification of prohibited species (e.g., dusky sharks), and current recreational rules and regulations. This alternative would likely result in short- and long-term neutral socioeconomic impacts since there would be no additional cost to the applicant and only a small additional investment in time. Obtaining the shark endorsement would be a part of the normal HMS Angling or Charter/Headboat permit application or renewal. The applicant would simply need to indicate the desire to obtain the shark endorsement after which he or she would be directed to the online quiz. The cost of developing the online quiz and administering the new shark endorsement may result in a slight increase in annual permit renewal fees, since the fee is set to recover the cost of administering the permit program, including maintenance of the public website and the toll-free phone system. The goal of the quiz is to help prevent anglers from landing prohibited or undersized sharks and thus help rebuild stocks. Furthermore, the list of shark endorsement holders would allow for more targeted surveys, likely increasing the reliability of recreational shark catch estimates.

In concert with targeted outreach through the shark endorsement, Alternative A2 would also include the development of a coordinated outreach, education, and enforcement campaign to reduce dusky shark mortality (through safe handling and release methods), improving regulatory compliance on prohibited species, and improving species identification and monitoring of catches in the recreational fishery. No direct socioeconomic impacts are expected in the short and long-term from the coordinated outreach, education, and enforcement campaign. Indirect socioeconomic impacts from this alternative would likely be neutral in the short- and long-term. Indirect socioeconomic impacts include impacts on supporting businesses such as bait and tackle suppliers, marinas, and the hospitality industry in coastal towns. Since obtaining the shark endorsement would not have any additional cost and only a modest increase in time, it is unlikely that any recreational angler would change their decision to recreationally fish for sharks based on the requirements, thus, supporting businesses are unlikely to be impacted. Thus, cumulative impacts are also expected to be neutral for this alternative.

Alternative A3

Alternative A3 would require participants in the recreational shark fishery to carry an approved shark identification placard on board the vessel when fishing for sharks. This alternative would likely result in direct short- and long-term minor adverse socioeconomic impacts. The cost of obtaining a placard, whether by obtaining a pre-printed one or self-printing, would be modest. To comply with the requirement of this alternative, the angler would need to keep the placard on board the vessel when fishing for sharks and, since carrying other documents such as permits and boat registration is already required, this is unlikely to be a large inconvenience.

Indirect socioeconomic impacts from this alternative would likely be neutral in the short- and long-term. Indirect socioeconomic impacts include impacts on supporting businesses such as bait and tackle suppliers, marinas, and the hospitality industry in coastal towns. Since obtaining and carrying a shark identification placard would have a small cost and only a modest increase in time, it is unlikely that any recreational angler would change their decision to target sharks based

on the requirements, thus, supporting businesses are unlikely to be impacted. Thus, cumulative impacts are also expected to be neutral for this alternative.

Alternative A4

Under Alternative A4, NMFS would extend the prohibition on the retention of ridgeback sharks to include the rest of the ridgeback sharks, namely oceanic whitetip, tiger sharks, and smoothhound sharks, all of which are currently allowed to be retained by recreational shark fishermen. While this alternative would simplify compliance for the majority of fishermen targeting sharks, it could also potentially have adverse socioeconomic impacts for a small subset of fishermen that target oceanic whitetip, tiger, and smoothhound sharks. A 2011 survey of Atlantic HMS Angling permit holders from Maine to North Carolina indicated that only 8.8 percent of trips taken by HMS Angling permit holders target sharks (Hutt, Lovell, and Silva, 2014). These adverse impacts would be minor, however, for oceanic whitetip and tiger sharks in the short and long-term. Based on MRIP data, from 2008-2015, no oceanic whitetip sharks and only 1,108 tiger sharks were harvested in the Atlantic and Gulf of Mexico by recreational fisherman, compared to 1,292,817 total sharks of all species. However, MRIP data suggests that 246,181 smoothhound sharks were harvested from 2008-2015. This could have major direct adverse impacts on fishermen targeting smoothhound sharks in the short and long-term. An important limitation of MRIP data, however, is that it is not possible to separate catch by federal and state permits. Since this action would only affect federally permitted anglers, not all of the ridgeback sharks catch would be precluded. Presumably, state-permitted anglers are responsible for some of the catch and, for species such as smooth dogfish that are typically found almost exclusively in state waters, state-permitted anglers may be responsible for most of the catch. Recreational fishermen with state-issued permits would still be able to retain smoothhound sharks, as the federal prohibition would not affect those permits absent additional state action. Thus, Alternative A4 would likely result in both direct short- and long-term, minor to major adverse socioeconomic impacts on Charter/Headboat operators and recreational fishermen by prohibiting landing of additional shark species. There would also be indirect short- and long-term, minor adverse socioeconomic impacts for associated bait and tackle shops and other fisheries supplier businesses. Cumulative impacts are also expected to be minor adverse for this alternative as fishermen will be prohibited from landing some sharks species.

Alternative A5

Under Alternative A5, the minimum recreational size limit for authorized shark species, except for Atlantic sharpnose, bonnethead, and hammerhead (great, scalloped, and smooth) sharks, would increase from 54 to 89 inches FL. Under this alternative, increasing the recreational size limit would likely result both direct short- and long-term, moderate adverse socioeconomic impacts for recreational fishermen. Because many shark species have a maximum size below an 89 inch FL size limit, there would be reduced incentive to fish recreationally for sharks due to the decreased potential to legally land these fish. Increasing the minimum size for retention would also impact the way that tournaments and charter vessels operate. While the impacts of an 89 inch FL minimum size on tournaments awarding points for pelagic sharks may be lessened because these tournament participants target larger sharks, such as shortfin mako, blue, and thresher, that grow to larger than 89 inches FL, this may not be the case for tournaments targeting smaller sharks. Tournaments that target smaller sharks, especially those that target shark species that do not reach sizes exceeding 89 inches FL such as blacktip sharks, may be

heavily impacted by this alternative. Reduced participation in such tournaments could potentially decrease the amount of monetary prizes offered to winners. Thus NMFS expects indirect moderate adverse socioeconomic impacts in the short and long-term if this affects participant in tournaments and the ability for charters to attract customers. Implementation of this management measure could significantly alter the way some tournaments and charter vessels operate, or reduce both opportunities to fish for sharks and the drastically reduce general interest and demand for recreational shark fishing, which could create cumulative moderate adverse socioeconomic impacts. For the aforementioned reasons, NMFS does not prefer this alternative at this time.

Alternative A6 – Circle Hook Alternatives

Alternative A6a– Preferred Alternative

Under Alternative A6a, a preferred alternative, circle hooks would be required for HMS permit holders with a shark endorsement fishing recreationally for sharks. To apply the requirement to fishermen that are fishing for sharks instead of other species, circle hooks would only be required when deploying natural bait while using a wire or heavy (200 lb test or greater) monofilament or fluorocarbon leader, although we are requesting comment to ensure that these criteria sufficiently encompass the entire group. Relative to the total cost of gear and tackle for a typical fishing trip, the cost associated with switching from J hooks to circle hooks is negligible. Thus, the immediate cost in switching hook type is likely minimal, resulting in direct minor adverse socioeconomic impacts in the short- and long-term. However, there is some indication that under certain circumstances the use of circle hooks may reduce catch per unit effort (CPUE) resulting in lower catch of target species. To the extent that CPUE is reduced, some recreational fishermen may choose not to fish for sharks or to enter tournaments that offer awards for sharks. These missed fishing opportunities could result in indirect minor adverse socioeconomic impacts in the short- and long-term, and cumulative minor adverse socioeconomic impacts. However, since the socioeconomic impacts are minor and circle hooks would help reduce fishing mortality for dusky sharks, consistent with the results of the 2016 dusky shark stock assessment update, NMFS prefers Alternative A6a at this time.

Alternative 6b

The intent of Alternative A6b is the same as Alternative A6a, to require the use of circle hooks when recreationally fishing for sharks; however, Alternative A6b differs in how recreational shark fishing would be defined. Alternative A6b would require circle hooks when deploying natural bait while using a 5/0 or larger hook size (Alternative A6a used natural bait and leader type to identify recreational shark fishing). Relative to the total cost of gear and tackle for a typical fishing trip, the cost associated with switching from J hooks to circle hooks is negligible. Thus, the immediate cost in switching hook type is likely minimal, resulting in direct minor adverse socioeconomic impacts in the short- and long-term. However, there is some indication that the use of circle hooks may reduce catch per unit effort (CPUE) resulting in lower catch of target species. To the extent that CPUE is reduced, some recreational fishermen may choose not to fish for sharks or to enter tournaments that offer awards for sharks. These missed fishing opportunities could result in indirect minor adverse socioeconomic impacts in the short- and long-term, and cumulative minor adverse socioeconomic impacts. Although Alternative A6b could provide beneficial impacts for dusky sharks, at this time, NMFS prefers to identify

recreational shark fishermen based on natural bait and leader type rather than natural bait and hook size for the previously-stated reasons in the alternative. Although NMFS does not prefer Alternative A6b at this time, the Agency requests comment on the best way to identify recreational shark fishing.

Alternative 6c
Under Alternatives A6c, circle hooks would be required for HMS permit holders participating in fishing tournaments that bestow points, prizes, or awards for sharks. Relative to the total cost of gear and tackle for a typical fishing trip, the cost associated with switching from J hooks to circle hooks is negligible. Thus, the immediate cost in switching hook type is likely minimal, particularly in the smaller subset of recreational fishermen that participate in shark tournaments; thus resulting in direct minor adverse socioeconomic impacts in the short- and long-term. However, there is some indication that in certain circumstances the use of circle hooks may reduce catch per unit effort (CPUE) resulting in lower catch of target species. To the extent that CPUE is reduced, some recreational fishermen may choose not to enter tournaments that offer awards for sharks. These missed fishing opportunities could result in indirect minor adverse socioeconomic impacts in the short and long-term, and cumulative minor adverse socioeconomic impacts.

Alternative A7
Alternative A7 would prohibit HMS Angling and Charter/Headboat permit holders from retaining any shark species. Recreational fishermen may still fish for and target authorized shark species for catch and release. While a large number of fishermen already practice catch and release, and there are also some catch and release shark fishing tournaments currently operating that would not be impacted, prohibiting retention of sharks could have major impacts on fishing behaviors and activity of recreational shark fishermen. Only allowing catch and release of authorized sharks in the recreational fishery could impact some fishermen that do retain sharks recreationally and tournaments that award points for landing sharks. Thus, prohibiting retention of Atlantic sharks in the recreational shark fisheries could drastically alter the nature of recreational shark fishing and reduce incentives to fish for sharks, thus resulting in direct moderate adverse socio-economic impacts in the short and long-term. Additionally, with reduced incentive to fish for sharks this could negatively impact profits for the Charter/Headboat industry and reduce the number of permits issued in both the HMS Angling and Charter/Headboat categories. This could result in indirect moderate adverse socioeconomic impacts in the short and long-term, and cumulative moderate adverse socioeconomic impacts. Because there could be major impacts to the recreational shark fisheries from this management measure, Alternative A7 would likely have both direct and indirect, short- and long-term, moderate adverse socioeconomic impacts.

4.4.2 Commercial Alternatives

Alternative B1
Under Alternative B1, NMFS would not implement any measures to reduce dusky shark mortality in the commercial shark or HMS fisheries. Since no management measures would be implemented under this alternative, NMFS would expect fishing practices to remain the same and direct socioeconomic impacts to be neutral in the short-term. Dusky sharks are a prohibited

species and fishermen are not allowed to harvest this species. Thus, even if dusky sharks continue to experience overfishing and the abundance declines as a result of this alternative, there would not be any socioeconomic impacts on the fishery in the short-term. If more restrictive measures are required in the long-term under MSA or other statutes such as the Endangered Species Act, direct moderate adverse socioeconomic impacts may occur. Indirect impacts to businesses like bait and ice houses and seafood dealers are expected to be neutral in the short and long-term as their businesses would not change. Cumulative impacts are also anticipated to be neutral given fishing effort would remain the same.

Alternative B2

Under Alternative B2, fishermen with an Atlantic shark commercial permit with pelagic longline gear onboard would be limited to 750 hooks per pelagic longline set with no more than 800 assembled gangions onboard the vessel at any time. Based on the average number of hooks per pelagic longline set data shown in Table 4.2, the hook restriction in this alternative could have direct neutral socioeconomic impacts in the short and long-term on fishermen targeting bigeye tuna, mixed tuna species, and mix species, because the average number of hooks used on pelagic longline sets targeting these species is slightly below the limit considered in this alternative. This alternative would likely have direct minor adverse socioeconomic impacts in the short and long-term on fishermen targeting dolphin fish, because these fishermen on average use 1,066 hooks per set. As of December 14, 2015, 164 dolphin/wahoo permit holders also have Atlantic Tunas Longline category permits. The Atlantic dolphin/wahoo fishery has the greatest overlap with the HMS pelagic longline fleet with 68 percent of the non-HMS vessels permits belonging in the Atlantic dolphin/wahoo fishery. Pelagic longline vessels permitted in the shark and swordfish fisheries are subject to the hook size regulations regarding the HMS fishery, which has impacted those vessels' ability to simultaneously fish for dolphin by attaching smaller-hooked gangions directly to their pelagic longline gear. If NMFS implemented this alternative, fishermen targeting dolphin fish with pelagic longline gear would have to reduce their number of hooks by approximately 30 percent per set, which may result in a similar percent reduction in set revenue or could result in increased operating costs if fishermen decide to offset the limited number of hooks with more fishing sets. Indirect impacts to businesses like bait and ice houses and seafood dealers could be minor and adverse in the short and long-term if this affected how often fishermen fished or their amount of catch to sell. Overall, Alternative B2 would be expected to have cumulative short- and long-term minor adverse socioeconomic impacts on the pelagic longline fishery.

Alternative B3 – Preferred Alternative

Under Alternative B3, a preferred alternative, fishermen with an Atlantic shark commercial permit fishing with pelagic longline gear would be required to release all sharks that are not being boarded or retained by using a dehooker, or by cutting the gangion no more than three feet from the hook. This alternative would have minor adverse socioeconomic impacts on commercial shark fishermen using pelagic longline gear in the short term. Currently, fishermen are required to use a dehooking device if a protected species (e.g., sea turtle or marine mammal) is caught. This alternative would require this procedure to be used on all sharks that would not be retained, or fishermen would have to cut the gangion to release the shark. Currently, it is common practice in the pelagic longline fishery to release sharks that are not going to be retained (especially larger sharks) by cutting the gangion, but they currently usually do not cut the

gangions so only three feet remains so there might be a slight learning curve associated with cutting the gangions no more than three feet from the hook. Therefore, the socioeconomic impacts associated with cutting the gangion to release sharks in this alternative would be minor in the short-term as the fishermen adjust to this new practice. Using a dehooker to release sharks in the pelagic longline fishery is a less common practice, therefore, there may be more of a learning curve that would make using this technique more time consuming and making fishing operations less efficient. Although this may be an initial issue, NMFS expects that these inefficiencies would be minimal and that fishermen would become adept in using a dehooker to release sharks over time given they are all adept at using a dehooker to release protected species. Thus, Alternative B3 would be expected to have neutral direct long-term socioeconomic impacts on the pelagic longline fishery. Indirect impacts to businesses like bait and ice houses and seafood dealers are expected to be neutral in the short and long-term as their businesses would not change. Cumulative impacts are also anticipated to be neutral given fishing effort would remain the same.

Alternative B4

Under Alternative B4, NMFS considered various dusky shark hotspot closures for vessels fishing with pelagic longline gear along with allowing conditional access and bycatch caps. The hotspot closures considered are the same areas that were analyzed in Draft Amendment 5 and the A5b Predraft. These hotspot closure alternatives are located where increased levels of PLL interactions with dusky sharks had been identified based on HMS Logbook data. During the months that hotspot closures would be effective, Atlantic shark commercial permit holders (directed or incidental) would not be able to fish with pelagic longline in these areas.

Alternative B4a - Prohibit the use of pelagic longline gear in HMS fisheries in a portion of the Charleston Bump during the month of May ("Charleston Bump Hotspot May").

This alternative would define a rectangular area in a portion of the existing Charleston Bump time/area closure area, and prohibit the use of pelagic longline gear by all vessels during the month of May in that area.

This alternative is expected to have moderate short and long-term direct adverse economic impacts on 46 vessels that have historically fished in this Charleston Bump area during the month of May. The average annual revenue from 2008 through 2014 from all fishing sets made in this area has been approximately $702,000 during the month of May. Thus, if that fishing effort does not move to other areas, this closure would result in the loss of approximately $702,000 in gross revenues per year.

However, it is likely that some of the vessels that would be impacted by this hotspot closure would redistribute their effort to other fishing areas. Based on natural breaks in the percentage of sets vessels made inside and outside of this alternative's hotspot closure area, NMFS estimated that if a vessel historically made less than 40 percent of its sets in the hotspot closure area, it would likely redistribute all of its effort. If a vessel made more than 40 percent but less than 75 percent of its sets in the hotspot closure area, it would likely redistribute 50 percent of its effort impacted by the hotspot closure area to other areas. Finally, if a vessel made more than 75 percent of its sets solely within the hotspot closure area, NMFS assumed the vessel would not

likely shift its effort to other areas. Based on these individually calculated redistribution rates, the percentage of fishing in other areas during the gear restriction time periods, the percentage of fishing in other areas during the hotspot closure time period, and the catch per unit effort for each vessel in each statistical area, NMFS estimated the potential landings associated with redistributed effort associated with fishing sets displaced by the hotspot closure area. The net loss in fishing revenues as a result of the Charleston Bump Hotspot May closure after considering likely redistribution of effort is estimated to be $382,000 per year. This is $320,000 less annually than the estimated impact under an assumption of no effort redistribution. Table 4.47 provides details on the loss of revenues before and after redistribution by major species landed.

Table 4.47 Estimated revenue impacts of the Charleston Bump Hotspot May closure area.

	Bluefin Tuna	**Swordfish**	**Bigeye Tuna**	**Yellowfin Tuna**	**Dolphin/ Wahoo**	**Shortfin Mako**	**Other**	**Total**
Loss of Revenue with no redistribution	$2,031	$320,905	$21	$4,063	$372,045	$1,590	$891	$701,547
Loss of Revenue with redistribution	-$4,063	$199,700	-$1,774	-$9,688	$198,061	-$1,363	$891	$381,765

*Negative loss refers to an increase in revenue.

HMS logbook records from 2008 to 2014 indicate that there were on average 42 reported dusky interactions per year in the Charleston Bump May area that would be avoided under this alternative. Comparing this reduction in dusky interactions to the estimated loss of revenues with redistribution of effort, the average cost per dusky interaction avoided for this alternative would be approximately $9,089.

Alternative B4a would result in moderate short- and long-term adverse social and economic impacts as a result of restricting pelagic longline vessels from fishing in the Charleston Bump Hotspot May area, thus causing decreased revenues and increased costs associated with fishing in potentially more distant waters if vessel operators redistribute their effort.

Alternative B4b - Prohibit the use of pelagic longline gear in HMS fisheries in the vicinity of the Cape Hatteras Special Research/Hatteras Shelf Area during the month of May ("Hatteras Shelf Hotspot May")

This alternative would prohibit the use of pelagic longline gear in the vicinity of the "Hatteras Shelf" area of the Cape Hatteras Special Research Area during the month of May where elevated levels of dusky shark interactions have been reported.

This alternative is expected to have moderate short and long-term direct adverse economic impacts on 42 vessels that have historically fished in this Hatteras Shelf Hotspot area during the month of May. The average annual revenue from 2008 through 2014 from all fishing sets made in this area has been approximately $419,000 during the month of May. Thus, if that fishing effort does not move to other areas, this closure would result in the loss of approximately $419,000 in gross revenues per year.

However, it is likely that some of the vessels that would be impacted by this hotspot closure would redistribute their effort to other fishing areas. The same redistribution rate assumptions as described for alternative B4a were employed for this analysis. Based on these individually calculated redistribution rates, the percentage of fishing in other areas during the hotspot closure time period, and the catch per unit effort for each vessel in each statistical area, NMFS estimated the potential landings associated with redistributed effort associated with fishing sets displaced by the hotspot closure area. The net impact of the Hatteras Shelf Hotspot May closure on fishing revenues after considering likely redistribution of effort is estimated to be $252,000 per year. This is $167,000 less annually than the estimated impact under an assumption of no effort redistribution. Table 4.48 provides details on the loss of revenues before and after redistribution by major species landed.

Table 4.48 Estimated revenue impacts of the Hatteras Shelf Hotspot May closure area.

	Bluefin Tuna	**Swordfish**	**Bigeye Tuna**	**Yellowfin Tuna**	**Dolphin/ Wahoo**	**Shortfin Mako**	**Other**	**Total**
Loss of Revenue with no redistribution	$12,238	$141,048	$27,290	$48,718	$167,629	$13,310	$8,886	$419,121
Loss of Revenue with redistribution	$8,159	$59,766	$24,764	$43,281	$94,925	$11,979	$8,886	$251,761

HMS logbook records from 2008 to 2014 indicate that there were on average 2 reported dusky interactions per year in the Hatteras Shelf May area that would be avoided under this alternative. Comparing this reduction in dusky interactions to the estimated loss of revenues with redistribution of effort, the average cost per dusky interaction avoided for this alternative would be approximately $125,881.

Alternative B4b would result in moderate short- and long-term adverse social and economic impacts as a result of restricting pelagic longline vessels from fishing in the Hatteras Shelf Hotspot May area, thus causing decreased revenues and increased costs associated with fishing in potentially more distant waters if vessel operators redistribute their effort.

Alternative B4c - Prohibit the use of pelagic longline gear in HMS fisheries in the vicinity of the Cape Hatteras Special Research/Hatteras Shelf Area during the month of June ("Hatteras Shelf Hotspot June")

This alternative would prohibit the use of pelagic longline gear in the vicinity of the "Hatteras Shelf" area of the Cape Hatteras Special Research Area during the month of June where elevated levels of dusky shark interactions have been reported.

This alternative is expected to have moderate short and long-term direct adverse economic impacts on 37 vessels that have historically fished in this Hatteras Shelf Hotspot area during the month of June. The average annual revenue from 2008 through 2014 from all fishing sets made in this area has been approximately $283,000 during the month of June. Thus, if that fishing

effort does not move to other areas, this closure would result in the loss of approximately $283,000 in gross revenues per year.

However, it is likely that some of the vessels that would be impacted by this hotspot closure would redistribute their effort to other fishing areas. The same redistribution rate assumptions as described for alternative B4a were employed for this analysis. Based on these individually calculated redistribution rates, the percentage of fishing in other areas during the hotspot closure time period, and the catch per unit effort for each vessel in each statistical area, NMFS estimated the potential landings associated with redistributed effort associated with fishing sets displaced by the hotspot closure area. The net impact of the Hatteras Shelf Hotspot June closure on fishing revenues after considering likely redistribution of effort is estimated to be $148,000 per year. This is $134,000 less annually than the estimated impact under an assumption of no effort redistribution. Table 4.49 provides details on the loss of revenues before and after redistribution by major species landed.

Table 4.49 Estimated revenue impacts of the Hatteras Shelf Hotspot June closure area.

	Bluefin Tuna	**Swordfish**	**Bigeye Tuna**	**Yellowfin Tuna**	**Dolphin/ Wahoo**	**Shortfin Mako**	**Other**	**Total**
Loss of Revenue with no redistribution	$12,035	$45,104	$38,871	$98,649	$83,299	$2,169	$2,758	$282,813
Loss of Revenue with redistribution	$5,158	-$19,330	$20,155	$76,282	$63,053	$394	$2,758	$148,470

HMS logbook records from 2008 to 2014 indicate that there were on average 47 reported dusky interactions per year in the Hatteras Shelf June area that would be avoided under this alternative. Comparing this reduction in dusky interactions to the estimated loss of revenues with redistribution of effort, the average cost per dusky interaction avoided for this alternative would be approximately $3,159.

Alternative B4c would result in moderate short- and long-term adverse social and economic impacts as a result of restricting pelagic longline vessels from fishing in the Hatteras Shelf Hotspot June area, thus causing decreased revenues and increased costs associated with fishing in potentially more distant waters if vessel operators redistribute their effort.

Alternative B4d - Prohibit the use of pelagic longline gear in HMS fisheries in the vicinity of the Cape Hatteras Special Research/Hatteras Shelf Area during the month of November ("Hatteras Shelf Hotspot November")

This alternative would prohibit the use of pelagic longline gear in the vicinity of the "Hatteras Shelf" area of the Cape Hatteras Special Research Area during the month of November where elevated levels of dusky shark interactions have been reported.

This alternative is expected to have moderate short and long-term direct adverse economic impacts on 23 vessels that have historically fished in this Hatteras Shelf Hotspot area during the month of November. The average annual revenue from 2008 through 2014 from all fishing sets

made in this area has been approximately $120,000 during the month of November. Thus, if that fishing effort does not move to other areas, this closure would result in the loss of approximately $120,000 in gross revenues per year.

However, it is likely that some of the vessels that would be impacted by this hotspot closure would redistribute their effort to other fishing areas. The same redistribution rate assumptions as described for alternative B4a were employed for this analysis. Based on these individually calculated redistribution rates, the percentage of fishing in other areas during the hotspot closure time period, and the catch per unit effort for each vessel in each statistical area, NMFS estimated the potential landings associated with redistributed effort associated with fishing sets displaced by the hotspot closure area. The net impact of the Hatteras Shelf Hotspot November closure on fishing revenues after considering likely redistribution of effort is estimated to be $81,000 per year. This is $39,000 less annually than the estimated impact under an assumption of no effort redistribution. Table 4.50 provides details on the loss of revenues before and after redistribution by major species landed.

Table 4.50 Estimated revenue impacts of the Hatteras Shelf Hotspot November closure area.

	Bluefin Tuna	**Swordfish**	**Bigeye Tuna**	**Yellowfin Tuna**	**Dolphin/ Wahoo**	**Shortfin Mako**	**Other**	**Total**
Loss of Revenue with no redistribution	$665	$46,995	$38,374	$28,771	$345	$3,429	$1,763	$120,341
Loss of Revenue with redistribution	$665	$23,643	$26,413	$26,552	$180	$2,269	$1,763	$81,486

HMS logbook records from 2008 to 2014 indicate that there were on average 14 reported dusky interactions per year in the Hatteras Shelf November area that would be avoided under this alternative. Comparing this reduction in dusky interactions to the estimated loss of revenues with redistribution of effort, the average cost per dusky interaction avoided for this alternative would be approximately $5,820.

Alternative B4d would result in moderate short- and long-term adverse social and economic impacts as a result of restricting pelagic longline vessels from fishing in the Hatteras Shelf Hotspot November area, thus causing decreased revenues and increased costs associated with fishing in potentially more distant waters if vessel operators redistribute their effort.

Alternative B4e - Prohibit the use of pelagic longline gear in HMS fisheries in three distinct closures in the vicinity of the Mid Atlantic Bight Canyons ("Canyons Hotspot October") during the month of October.

This alternative would prohibit the use of pelagic longline gear by all vessels permitted to fish for HMS in the three distinct closures in the vicinity of the Mid-Atlantic Canyons during the month of October where elevated levels of dusky shark interactions have been reported.

This alternative is expected to have moderate short and long-term direct adverse economic impacts on 64 vessels that have historically fished in this Canyons Hotspot October area. The

average annual revenue from 2008 through 2014 from all fishing sets made in this area has been approximately $637,000 during the month of October. Thus, if that fishing effort does not move to other areas, this closure would result in the loss of approximately $637,000 in gross revenues per year.

However, it is likely that some of the vessels that would be impacted by this hotspot closure would redistribute their effort to other fishing areas. The same redistribution rate assumptions as described for alternative B4a were employed for this analysis. Based on these individually calculated redistribution rates, the percentage of fishing in other areas during the hotspot closure time period, and the catch per unit effort for each vessel in each statistical area, NMFS estimated the potential landings associated with redistributed effort associated with fishing sets displaced by the hotspot closure area. The net impact of the Canyons Hotspot October closure on fishing revenues after considering likely redistribution of effort is estimated to be $238,000 per year. This is $399,000 less annually than the estimated impact under an assumption of no effort redistribution. Table 4.51 provides details on the loss of revenues before and after redistribution by major species landed.

Table 4.51 Estimated revenue impacts of the Canyons Hotspot October closure area.

	Bluefin Tuna	**Swordfish**	**Bigeye Tuna**	**Yellowfin Tuna**	**Dolphin/ Wahoo**	**Shortfin Mako**	**Other**	**Total**
Loss of Revenue with no redistribution	$8,906	$200,230	$258,116	$120,534	$4,287	$7,210	$37,732	$637,014
Loss of Revenue with redistribution	$5,937	$77,562	$101,268	$10,766	$93	$4,486	$37,732	$237,844

HMS logbook records from 2008 to 2014 indicate that there were on average 14 reported dusky interactions per year in the Canyons Hotspot October area that would be avoided under this alternative. Comparing this reduction in dusky interactions to the estimated loss of revenues with redistribution of effort, the average cost per dusky interaction avoided for this alternative would be approximately $16,989.

Alternative B4e would result in moderate short- and long-term adverse social and economic impacts as a result of restricting pelagic longline vessels from fishing in the Canyons Hotspot October area, thus causing decreased revenues and increased costs associated with fishing in potentially more distant waters if vessel operators redistribute their effort.

Alternative B4f - Prohibit the use of pelagic longline gear in HMS fisheries in an area in the vicinity of the existing Northeastern closed area during the month of July ("Southern Georges Banks Hotspot July").

This alternative would prohibit the use of pelagic longline gear by all U.S. flagged-vessels permitted to fish for HMS in July in an area adjacent to the existing Northeastern U.S. closure which is currently effective for the month of June, where elevated levels of dusky shark interactions have been reported.

This alternative is expected to have moderate short and long-term direct adverse economic impacts on 35 vessels that have historically fished in this Southern Georges Banks Hotspot area during the month of July. The average annual revenue from 2008 through 2014 from all fishing sets made in this area has been approximately $498,000 during the month of July. Thus, if that fishing effort does not move to other areas, this closure would result in the loss of approximately $498,000 in gross revenues per year.

However, it is likely that some of the vessels that would be impacted by this hotspot closure would redistribute their effort to other fishing areas. The same redistribution rate assumptions as described for alternative B4a were employed for this analysis. Based on these individually calculated redistribution rates, the percentage of fishing in other areas during the hotspot closure time period, and the catch per unit effort for each vessel in each statistical area, NMFS estimated the potential landings associated with redistributed effort associated with fishing sets displaced by the hotspot closure area. The net impact of the Southern Georges Banks Hotspot July closure on fishing revenues after considering likely redistribution of effort is estimated to be $290,000 per year. This is $208,000 less annually than the estimated impact under an assumption of no effort redistribution. Table 4.52 provides details on the loss of revenues before and after redistribution by major species landed.

Table 4.52 Estimated revenue impacts of the Southern Georges Banks Hotspot July closure area.

	Bluefin Tuna	**Swordfish**	**Bigeye Tuna**	**Yellowfin Tuna**	**Dolphin/ Wahoo**	**Shortfin Mako**	**Other**	**Total**
Loss of Revenue with no redistribution	$18,797	$332,145	$44,870	$70,507	$10,815	$13,443	$7,448	$498,026
Loss of Revenue with redistribution	$14,098	$284,476	-$25,266	-$5,002	$3,957	$10,563	$7,448	$290,274

HMS logbook records from 2008 to 2014 indicate that there were on average 13 reported dusky interactions per year in the Southern Georges Banks Hotspot July area that would be avoided under this alternative. Comparing this reduction in dusky interactions to the estimated loss of revenues with redistribution of effort, the average cost per dusky interaction avoided for this alternative would be approximately $22,329.

Alternative B4f would result in moderate short- and long-term adverse social and economic impacts as a result of restricting pelagic longline vessels from fishing in the Southern Georges Banks Hotspot July area, thus causing decreased revenues and increased costs associated with fishing in potentially more distant waters if vessel operators redistribute their effort.

Alternative B4g - Prohibit the use of pelagic longline gear in HMS fisheries in an area in the vicinity of the existing Northeastern closed area during the month of August ("Southern Georges Banks Hotspot August").

This alternative would prohibit the use of pelagic longline gear by all U.S. flagged-vessels permitted to fish for HMS in August in an area adjacent to the existing Northeastern U.S.

closure, which is currently effective for the month of June, where elevated levels of dusky shark interactions have been reported.

This alternative is expected to have moderate short and long-term direct adverse economic impacts on 35 vessels that have historically fished in this Southern Georges Banks Hotspot area during the month of August. The average annual revenue from 2008 through 2014 from all fishing sets made in this area has been approximately $429,000 during the month of August. Thus, if that fishing effort does not move to other areas, this closure would result in the loss of approximately $429,000 in gross revenues per year.

However, it is likely that some of the vessels that would be impacted by this hotspot closure would redistribute their effort to other fishing areas. The same redistribution rate assumptions as described for alternative B4a were employed for this analysis. Based on these individually calculated redistribution rates, the percentage of fishing in other areas during the hotspot closure time period, and the catch per unit effort for each vessel in each statistical area, NMFS estimated the potential landings associated with redistributed effort associated with fishing sets displaced by the hotspot closure area. The net impact of the Southern Georges Banks Hotspot August closure on fishing revenues after considering likely redistribution of effort is estimated to be $210,000 per year. This is $219,000 less annually than the estimated impact under an assumption of no effort redistribution. Table 4.53 provides details on the loss of revenues before and after redistribution by major species landed.

Table 4.53 Estimated revenue impacts of the Southern Georges Banks Hotspot August closure area.

	Bluefin Tuna	**Swordfish**	**Bigeye Tuna**	**Yellowfin Tuna**	**Dolphin/ Wahoo**	**Shortfin Mako**	**Other**	**Total**
Loss of Revenue with no redistribution	$1,142	$173,244	$87,321	$142,827	$4,861	$11,232	$8,486	$429,113
Loss of Revenue with redistribution	$1,142	$122,810	$1,882	$65,595	$1,485	$8,424	$8,486	$209,824

HMS logbook records from 2008 to 2014 indicate that there were on average 10 reported dusky interactions per year in the Southern Georges Banks Hotspot August area that would be avoided under this alternative. Comparing this reduction in dusky interactions to the estimated loss of revenues with redistribution of effort, the average cost per dusky interaction avoided for this alternative would be approximately $20,982.

Alternative B4g would result in moderate short- and long-term adverse social and economic impacts as a result of restricting pelagic longline vessels from fishing in the Southern Georges Banks Hotspot August area, thus causing decreased revenues and increased costs associated with fishing in potentially more distant waters if vessel operators redistribute their effort.

Alternative B4h - Prohibit the use of pelagic longline gear in HMS fisheries in a portion of the Charleston Bump during the month of November ("Charleston Bump Hotspot November").

This alternative would prohibit the use of pelagic longline gear by all U.S. flagged-vessels permitted to fish for HMS in a portion of the existing Charleston Bump time/area closure during the month of November where elevated levels of dusky shark interactions have been reported.

This alternative is expected to have minor short and long-term direct adverse economic impacts on 32 vessels that have historically fished in this Charleston Bump Hotspot area during the month of November. The average annual revenue from 2008 through 2014 from all fishing sets made in this area has been approximately $225,000 during the month of November. Thus, if that fishing effort does not move to other areas, this closure would result in the loss of approximately $225,000 in gross revenues per year across the fleet

However, it is likely that some of the vessels that would be impacted by this hotspot closure would redistribute their effort to other fishing areas. The same redistribution rate assumptions as described for alternative B4a were employed for this analysis. Based on these individually calculated redistribution rates, the percentage of fishing in other areas during the hotspot closure time period, and the catch per unit effort for each vessel in each statistical area, NMFS estimated the potential landings associated with redistributed effort associated with fishing sets displaced by the hotspot closure area. The net impact of the Charleston Bump Hotspot November closure on fishing revenues after considering likely redistribution of effort is estimated to be $87,000 per year. This is $138,000 less annually than the estimated impact under an assumption of no effort redistribution. Table 4.54 provides details on the loss of revenues before and after redistribution by major species landed.

Table 4.54 Estimated revenue impacts of the Charleston Bump Hotspot November closure area.

	Bluefin Tuna	**Swordfish**	**Bigeye Tuna**	**Yellowfin Tuna**	**Dolphin/ Wahoo**	**Shortfin Mako**	**Other**	**Total**
Loss of Revenue with no redistribution	$0	$218,537	$389	$1,736	$2,495	$1,219	$580	$224,956
Loss of Revenue with redistribution	-$1,210	$102,285	-$1,945	-$13,889	-$123	$1,219	$580	$86,916

HMS logbook records from 2008 to 2014 indicate that there were on average 9 reported dusky interactions per year in the Charleston Bump Hotspot November area that would be avoided under this alternative. Comparing this reduction in dusky interactions to the estimated loss of revenues with redistribution of effort, the average cost per dusky interaction avoided for this alternative would be approximately $9,657.

Alternative B4h would result in minor short- and long-term adverse social and economic impacts as a result of restricting pelagic longline vessels from fishing in the Charleston Bump Hotspot November area, thus causing decreased revenues and increased costs associated with fishing in potentially more distant waters if vessel operators redistribute their effort.

Alternative B4i - Allow conditional access to dusky shark hotspot closure areas for HMS vessels fishing with pelagic longline gear

This alternative would allow conditional access to dusky shark hotspot closure areas for some vessels fishing with pelagic longline gear who report or are observed interacting with the fewest dusky sharks in a year. This approach would address the fact that, according to HMS logbook data, relatively few vessels have consistently accounted for the majority of the dusky shark interactions. Conditional access would not impact the entire pelagic longline fleet for interactions made by a relatively small proportion of vessels. Thus, Alternative B4i would have direct short-term minor adverse socioeconomic impacts on vessels with the highest dusky shark interactions since they would be prohibited in the hotspot closure areas until they modify fishing behavior to avoid dusky sharks and reduce interactions. In the long-term, this alternative would have neutral direct socioeconomic impacts as the vessels would avoid dusky sharks to gain access to the hotspot closure areas. For the majority of the pelagic longline fleet, this alternative would have short- and long-term neutral socioeconomic impacts as vessels would have access to the hotspot closure areas and would not have to change their current fishing operations. Thus, indirect impacts to businesses like bait and ice houses and seafood dealers are expected to be neutral in the short and long-term as their businesses would not change. Cumulative impacts are also anticipated to be neutral given fishing effort would remain the same.

Alternative B4j: Implement dusky shark bycatch caps in the pelagic longline fishery
This alternative would implement bycatch caps on dusky shark interactions in hotspot areas on a three-year basis. Under Alternative B4j, NMFS would allow pelagic longline vessels limited access to high dusky shark interaction areas with an observer onboard while limiting the number of dusky shark interactions that could occur in these areas. Once the dusky shark bycatch cap for an area is reached, that area would close until the end of the three-year bycatch cap period. This alternative would have direct short- and long-term moderate adverse socioeconomic impacts as vessels would not be allowed access in the hotspot closure areas until an observer is available and observer coverage is not expected to increase in the near future. Thus, the majority of the pelagic longline fleet will not have access to the hotspot closure areas for fishing, resulting in cumulative moderate adverse socioeconomic impacts. Indirect impacts to businesses like bait and ice houses and seafood dealers could be minor and adverse in the short and long-term if this affected how often fishermen fished or their amount of catch to sell.

Summary and Conclusions of the B4 Hotspot Closure Alternatives
In summary, the combined eight considered pelagic longline hot spot closures for dusky sharks would result in moderate short- and long-term direct and indirect adverse economic impacts. The average annual revenue from 2008 through 2014 from all fishing sets made in all eight Alternative B4 hotspot closures has been approximately $3.31 million (Table 4.55). Adjustments for potential redistribution of effort that would likely occur with those hotspot closures are estimated to be $1.68 million per year. That is approximately 5 percent of the estimated $34 million in revenues generated by the Atlantic pelagic longline fleet per year. Of that $1.68 million in forgone revenue with redistribution, $851,000 is estimated to be from swordfish.

Table 4.55 Estimated revenue impacts of the combined B4 Hotspot closure areas.

	Bluefin Tuna	Swordfish	Bigeye Tuna	Yellowfin Tuna	Dolphin/ Wahoo	Shortfin Mako	Other	Total
Loss of Revenue with no redistribution	$55,814	$1,478,208	$495,252	$515,805	$645,776	$53,602	$68,544	$3,312,931
Loss of Revenue with redistribution	$29,886	$850,912	$145,497	$193,897	$361,631	$37,971	$68,544	$1,688,340

NMFS estimates that there would be on average 153 reported dusky interactions per year in the combined B4 hotspot areas that would be avoided under this alternative based on logbook records from 2008 to 2014. Comparing this reduction in dusky interactions to the estimated loss of revenues with redistribution of effort, the average cost per dusky interaction avoided for this alternative would be approximately $11,035 across the fleet.

Alternative B4 would result in moderate short- and long-term adverse social and economic impacts as a result of restricting pelagic longline vessels from fishing in the hotspot area, thus causing decreased revenues and increased costs associated with fishing in potentially more distant waters if vessel operators redistribute their effort.

Alternative B5 – Preferred Alternative

Alternative B5, a preferred alternative, would require completion of shark identification and fishing regulation training as part of the Safe Handling and Release Workshop for HMS pelagic longline, bottom longline, and shark gillnet vessel owners and operators. This alternative would improve compliance with all prohibited shark regulations, including the prohibition on dusky shark retention. The course would be taught in conjunction with current Protected Species Safe Handling, Release, and Identification Workshops, and vessel owners and operators would be required to attend every three years. This additional training is expected to have minimal additional costs to the Agency per year to conduct based on current workshop costs. The training course would provide information regarding shark identification and regulations, as well as best practices to avoid interacting with dusky sharks and how to minimize mortality of dusky sharks caught as bycatch. This alternative would have minor adverse direct socioeconomic impacts in the short and long-term since the fishermen would be required to attend a workshop as they currently do every three years, incur some travel costs, and would not be fishing while taking attending the workshop. Indirect impacts to businesses like bait and ice houses and seafood dealers are expected to be neutral in the short and long-term as their businesses would not change. Cumulative impacts are also anticipated to be neutral given fishing effort would remain the same.

Alternative B6 – Preferred Alternative

The direct socioeconomic impacts associated with Alternative B6, which would establish a communication and fishing set relocation protocol for pelagic longline, bottom longline, and gillnet fishermen following interactions with dusky sharks and increase outreach to the HMS

fleet, are anticipated to be neutral in the short- and long-term. These requirements would not cause a substantial change to current fishing operations, but have the potential to help fishermen become more adept in avoiding dusky sharks. If fishermen become better at avoiding dusky sharks, there is the possibility that target catch could increase. On the other hand, the requirement to move the subsequent fishing set one nautical mile from where a previous dusky shark interaction occurred could move fishermen away from areas where they would prefer to fish and it could increase fuel usage and fuel costs. Indirect impacts to businesses like bait and ice houses and seafood dealers are expected to be neutral in the short and long-term as their businesses would not change. Cumulative impacts are also anticipated to be neutral given fishing effort would remain the same.

Alternative B7

NMFS would seek, through collaboration with the affected states and the ASMFC, to extend the end date of the existing state shark closure from July 15 to July 31. Currently, the states of Virginia, Maryland, Delaware, and New Jersey have a state-water commercial shark closure from May 15 to July 15. In 2015, 205 lb dw of aggregated LCS and 48 lb dw of hammerhead sharks were landed by commercial fishermen in Virginia, Maryland, and New Jersey from July 15 to July 31. Based on 2015 ex-vessel prices, the annual gross revenues loss for aggregated LCS and hammerhead shark meat to the regional fleet in revenues due to an extended closure date would be $195, while the shark fins would be $58. Thus, the total loss annual gross revenue for aggregated LCS and hammerhead sharks would be $253 (Table 4.56). Extending this closure by 16 days could cause a reduction of commercial fishing opportunity, likely resulting in short-term direct minor adverse socioeconomic impacts due to reduced opportunities to harvest aggregated LCS and hammerhead sharks. In the long-term, the direct impacts from this reduction would be neutral since fishermen would be able to adapt to the new opening date. Indirect impacts to businesses like bait and ice houses and seafood dealers are expected to be minor and adverse in the short term as they adjust to the timing, but neutral in the long-term as their businesses would adjust to the change. Cumulative impacts are anticipated to be neutral given overall fishing effort would remain the same.

Table 4.56 2015 Ex-vessel prices and annual gross revenues on aggregated LCS and hammerhead shark landings from July 15 through July 31. Shark fins are assumed to be 5 percent of the carcass weight. Source: eDealer Database 2015.

Species	Landings (lb dw)	2014 Ex-Vessel Price	Annual Gross Revenues
Aggregated LCS	205	$0.80	$164
Fins	10	$4.73	$47
Hammerhead Shark	48	$0.65	$31
Fins	2	$10.25	$11
Total LCS Meat	253		$195
Total LCS Fin	12		$58

Alternative B8

Under Alternative B8, NMFS would prohibit pelagic longline gear as an authorized gear for Atlantic HMS. All commercial fishing with pelagic longline gear for HMS in the Atlantic, Gulf of Mexico, and Caribbean would be prohibited. This would greatly reduce fishing opportunities

for pelagic longline fishing vessel owners. Prohibiting the use of pelagic longline fishing gear would result in direct and indirect, major adverse economic impacts in the short and long-term for pelagic longline vessel owners, operators, and crew.

Between 2008 and 2014, 168 different vessels reported using pelagic longline fishing gear in Atlantic HMS Logbooks. Average annual revenues were estimated to be approximately $34,322,983 per year based on HMS logbook records, bluefin tuna dealer reports, and the eDealer database. In 2014, there were 110 active pelagic longline vessels which produced approximately $33,293,118 in revenues. The 2014 landings value is in line with the 2008 to 2014 average. Therefore, NMFS expects future revenues to be approximately $34 million per year based on past landings.

In addition to direct impacts to vessel owners, operators, and crew members, this alternative would have major, adverse indirect impacts in the short and long-term on fish dealers, processors, bait/gear suppliers, and other shore-based businesses in the vicinity of the fishing ports impacted by reduced fishing opportunities for pelagic longline vessel owners. Prohibiting the use of longline gear would result in major, indirect social impacts ranging from disruption of local fishing communities to relocation of vessels and homeports, lows of crew, increased time at sea, and other social hardships stemming from further reduced fishing opportunities for HMS fishery participants. The states with the most tuna longline permit holders are Florida (43.6 percent), New Jersey (14.6 percent), Louisiana (13.2 percent), New York (7.1 percent), and North Carolina (3.6 percent). The states with the highest total number of HMS dealer permits are Florida (21.1 percent), Massachusetts (17.5 percent), New York (11.6 percent), North Carolina (10.0 percent), and New Jersey (9.9 percent).

HMS logbook records from 2008 to 2014 indicate that there were on average 538 reported dusky interactions per year. If pelagic longline gear was prohibited, it could be expected that these interactions would not occur. Comparing this reduction in dusky interactions to the estimated foregone revenues from the pelagic longline fleet of approximately $34 million per year, the average cost per dusky interaction avoided would be approximately $63,197. Thus, the cumulative impacts are anticipated to be major and adverse given drastic reduction in fishing effort and overall revenues.

Alternative B9 – Preferred Alternative

Alternative B9, a preferred alternative, would require HMS shark directed limited access permit holders to use circle hooks in the bottom longline fishery. This alternative would require the 120 permit holders that hold a shark directed limited access permit and not an Atlantic tunas Longline permit, which requires fishermen to use circle hooks with pelagic longline gear, to buy and use circle hooks in the bottom longline fishery. However, data from the 2015 bottom longline observer program shows that 75 percent of observed trips of bottom longline fishermen already use circle hooks and 25 percent of observed trips employed a combination of J and circle hooks. Alternative B9 would result in neutral direct short- and long-term social and economic impacts as majority of the HMS shark directed limited access permit holders already possess or use circle hooks while fishing for HMS species. For those permit holders who do not use circle hooks, the cost of circle hooks is comparable to J hooks. In addition, using circle hooks over J hooks could allow fishermen to retrieve the hooks easier since circle hooks usually catch the

sharks in the side of their mouths while J hooks are usually swallowed or lines are bitten off by the sharks. Indirect impacts to businesses like bait and ice houses and seafood dealers are expected to be neutral in the short and long-term as their businesses would not change. Cumulative impacts are also anticipated to be neutral given fishing effort would remain the same.

Alternative B10

Under Alternative B10, NMFS would implement Individual Dusky Shark Bycatch Quotas (IDQs) for the commercial pelagic and bottom longline fisheries. The goal of this alternative would be to provide strong individual incentives to reduce dusky shark interactions while providing flexibility for vessels to continue to operate in the fishery; however, several unique issues associated with dusky sharks would make these goals difficult to achieve.

Because the stock assessment used a catch-free model, NMFS does not have an estimate to use at this time to appropriately calculate how many dusky sharks should be allocated to the PLL and BLL fisheries, nor is there a basis for determining the appropriate individual allocation to each vessel. One possible approach would be to extrapolate the current observer data to the entire fleet but those results would be highly uncertain as described above. As noted in SEDAR 21, the stock assessment scientists used a catch-free model in part because of the high degree of uncertainty in reported catches or catches not being reported at all. Given the mortality reductions needed, any such estimate would then need to be reduced in order to end overfishing. Under this approach, NMFS anticipates that the allocations to each vessel could be extremely and inappropriately low (single digits per vessel) in addition to being highly uncertain. Some vessels would be constrained by the amount of individual quota they are allocated and this could unnecessarily reduce their annual revenue. If a pelagic longline vessel interacts with dusky sharks early in the year and uses their full IDQ allocation, they may be unable to continue fishing with pelagic longline or bottom longline gear for the rest of the year if they are unable to lease quota from other IDQ holders. This would result in short- and long-term adverse economic impacts to longline vessel owners resulting from reduced revenues.

Furthermore, if vessel owners are only allocated a very low amount of IDQs, it is very unlikely that an active trading market for IDQs will emerge. The initial allocations could be insufficient for many vessels to maintain their current levels of fishing activity and they may not be able to find IDQs to lease or have insufficient capital to lease a sufficient amount of IDQs. Some vessel owners may view the risk of exceeding their IDQ allocations and the associated costs of acquiring additional quota to outweigh the potential profit from fishing, so they may opt to not continue participating in the fishery. While some level of this effect would be an appropriate result of an IDQ program, its basis on such uncertain information here would make these effects unnecessary.

The annual transaction costs associated with matching lessor and lessees, the costs associated with drafting agreements, and the uncertainty vessel owners would face regarding quota availability would reduce some of the economic benefits associated with leasing quota and fishing.

There would also be increased costs associated with bottom longline vessels obtaining and installing EM and VMS units. Some bottom longline vessel owners might have to consider obtaining new vessels if their current vessels cannot be equipped with EM and VMS. There would be increased costs associated with VMS reporting of dusky interactions. Some fishermen would also need to ship EM hard drives after each trip and they may need to consider acquiring extra hard drives to avoid not having one available when they want to go on a subsequent trip.

Overall, this alternative might result in direct short- and long-term moderate to significant adverse economic impacts to pelagic and bottom longline vessels. There would also be potential short- and long-term indirect adverse impacts to HMS dealers and shore side support businesses that service longline vessels that are unable to fish due to IDQ shortfalls.

4.5 References

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5.0 Cumulative Impacts

5.1 Past, Present, and Reasonably Foreseeable Actions

As discussed in Section 3.1, NMFS has taken a number of actions in the past in order to, among other things, rebuild overfished fisheries and prevent overfishing of Atlantic sharks. These actions have included FMPs, FMP amendments, and framework actions. The goals and objectives of these past rules are summarized in Section 3.1. NMFS is required to take similar actions in this document and can reasonably expect to implement regulations in the future to address the management and conservation of Atlantic sharks in directed shark fisheries and in fisheries that catch sharks. The need and objectives of this document are described in earlier sections, particularly Chapter 1.0, and are not repeated here.

Other recent major actions within HMS fisheries that may affect commercial and recreational fishermen both directly and indirectly are listed below (Table 5.1). These fisheries are expected to be most affected by the proposed measures in Draft Amendment 5b. A comprehensive list of all actions annually can be found in Chapter 1 of the annual SAFE Report.

Table 5.1 Recent major actions within HMS fisheries that may affect pelagic longline and recreational HMS fishermen dealing with sharks.

Federal Register Cite	Date	Rule or Notice
2008		
73 FR 19795	4/11/2008	Proposed rule for renewal of Atlantic Tunas Longline category limited access permits; and, Atlantic shark dealer workshop attendance requirements
73 FR 24922	5/6/2008	Proposed rule for Atlantic tuna fisheries; gear authorization and turtle control devices
73 FR 35778	6/24/2008	Final rule for Amendment 2 to the 2006 Consolidated HMS FMP and fishing season notification
73 FR 35623	6/24/2008	Proposed rule for the Atlantic pelagic longline take reduction plan
73 FR 35834	6/24/2008	2008 Shark research fishery; Notice of intent; request for applications
73 FR 38144	7/3/2008	Final rule for renewal of Atlantic Tunas Longline category limited access permits; and, Atlantic shark dealer workshop attendance requirements
73 FR 40658	7/15/2008	Final rule for Amendment 2 to the 2006 Consolidated HMS FMP and fishing season notification; correction/republication
73 FR 54384	9/19/2008	Draft Essential Fish Habitat (EFH) for Amendment 1 to the 2006 Consolidated HMS FMP
73 FR 63668	10/27/2008	Proposed rule for 2009 shark fishing season
73 FR 65294	11/3/2008	2009 Shark research fishery; Notice of intent; request for applications
73 FR 79005	12/24/2008	NMFS establishes the annual quotas for the 2009 shark fishing season
2009		
74 FR 28018	6/12/2009	Final EFH for Amendment 1 to the 2006 Consolidated HMS FMP
74 FR 55526	10/28/2009	Proposed rule for 2010 shark fishing season
74 FR 56177	10/30/2009	Notice of intent for 2010 shark research fishery; request for applications
2010		
75 FR 250	1/5/2010	Final rule for the 2010 Commercial Quotas and Opening Dates for the Atlantic Shark Fisheries
75 FR 22103	4/27/2010	Atlantic Coastal Fisheries Cooperative Management Act Provisions; Atlantic Coastal Shark Fishery

Federal Register Cite	Date	Rule or Notice
75 FR 44938	7/30/2010	Atlantic Coastal Fisheries Cooperative Management Act Provisions; Atlantic Coastal Shark Fishery
75 FR 57240	9/20/2010	Proposed Rule for the Atlantic Shark Fishery
75 FR 57259	9/20/2010	Request for Applications for Participation in the Atlantic Highly Migratory Species 2011 Shark Research Fishery
75 FR 76302	12/8/2010	Final rule for the 2011 Commercial Quotas and Opening Dates for the Atlantic Shark Fisheries
2011		
76 FR 2313	1/13/2011	Proposed rule to require "weak hooks" in the Gulf of Mexico
76 FR 18653	4/5/2011	Final rule to require "weak hooks" in the Gulf of Mexico
76 FR 23935	4/29/2011	Proposed Rule to Implement the 2010 International Commission for the Conservation of Atlantic Tunas (ICCAT) Recommendations on Sharks
76 FR 53652	8/29/2011	Final Rule to Implement the 2010 ICCAT Recommendations on Sharks
76 FR 67121	10/31/2011	Proposed Rule to Establish the Quotas and opening Dates for the 2012 Atlantic Shark Commercial Fishing Season
76 FR 67149	10/31/2011	Request for Applications for Participation in the Atlantic Highly Migratory Species 2012 Shark Research Fishery
2012		
77 FR 3393	1/24/2012	Final Rule to Establish the Quotas and Opening Dates for the 2012 Atlantic Shark Commercial Fishing Season
77 FR 8218	2/14/2012	NMFS Announces a Public Meeting for Selected Participants of the 2012 Shark Research Fishery
77 FR 24161	4/23/2012	Notice of intent for Amendment 7 to the 2006 Consolidated HMS FMP
77 FR 31562	5/29/2012	NMFS Considers Adding Gulf of Mexico Sharks to Amendment 5 to the 2006 Consolidated HMS FMP
77 FR 35357	6/13/2012	NMFS Announces the Opening Date of the Commercial Atlantic Region Non-Sandbar Large Coastal Fishery
77 FR 37647	6/21/2012	Proposed Rule to Prohibit Retention of Silky Sharks Caught in ICCAT Fisheries
77 FR 60632	10/4/2012	Final Rule to Prohibit Retention of Silky Sharks Caught in ICCAT Fisheries
77 FR 61562	10/10/2012	Proposed Rule to Establish the Quotas and Opening Dates for the 2013 Atlantic Shark Commercial Fishing Season
77 FR 67631	10/13/2012	Notice of Intent for Applications to the 2013 Shark Research Fishery
77 FR 70552	11/26/2012	Proposed Rule for Amendment 5 to the 2006 Consolidated HMS FMP
77 FR 75896	12/21/2012	Final Rule Regarding the 2013 Atlantic Shark Fishery Season
2013		
78 FR 24148	4/24/2013	Notice of Intent to Prepare an Environmental impact Statement and Associated Rulemaking for Dusky Shark Management Measures
78 FR 25685	5/2/2013	Proposed Rule to Implement Provisions of the Shark Conservation Act of 2010
78 FR 29100	5/17/2013	90-Day Finding on Petitions to List Dusky Shark as Threatened or Endangered Under the Endangered Species Act
78 FR 52012	8/21/2013	Proposed Rule for Amendment 7 to the 2006 Consolidated HMS FMP
78 FR 52487	8/23/2013	Proposed Rule to Establish the Quotas and Opening Dates for the 2014 Atlantic Shark Commercial Fishing Season
78 FR 53754	8/30/2013	Draft Environmental Impact Statement for Amendment 7 to the 2006 Consolidated HMS FMP
78 FR 70018	11/22/2013	Notice of Intent for Applications to the 2014 Shark Research Fishery
78 FR 70500	11/26/2013	Final Rule Regarding the 2014 Atlantic Shark Commercial Fishing Season
2014		
79 FR 12155	3/4/2014	Public Meeting for Selected Participants of the 2014 Shark Research Fishery
79 FR 15959	3/24/2014	Initiation of 5-Year EFH Review
79 FR 54252	9/11/2014	Proposed Rule to Establish the Quotas and Opening Dates for the 2015 Atlantic Shark Commercial Fishing Season

Federal Register Cite	Date	Rule or Notice
79 FR 64750	10/31/2014	Notice of Intent for Applications to the 2014 Shark Research Fishery
79 FR 71510	12/2/2014	Final Rule for Amendment 7 to the 2006 Consolidated HMS FMP
79 FR 71331	12/2/2014	Final Rule to Establish the Quotas and Opening Dates for the 2015 Atlantic Shark Commercial Fishing Season
79 FR 74684	12/16/2014	12-Month Finding on Petition to List the Northwest Atlantic Population of the Dusky Shark Under the Endangered Species Act
2015		
80 FR 2916	1/21/2015	Notice of Intent for Applications from the Gulf of Mexico Region to the 2015 Shark Research Fishery
80 FR 3221	1/22/2015	Public Meeting for Selected Participants of the 2015 Shark Research Fishery
80 FR 11981	3/5/2015	NMFS Announces the Draft Atlantic HMS Essential Fish Habitat 5-Year Review
80 FR 37598	7/1/2015	NMFS Announces the Availability of the Final Atlantic HMS Essential Fish Habitat 5-Year Review and Notice of Intent to Amend the 2006 Consolidated HMS FMP
80 FR 49974	8/18/2015	Proposed Rule to Establish the Quotas and Opening Dates for the 2016 Atlantic Shark Commercial Fishing Season
80 FR 68513	11/5/2015	Notice of Intent for Applications to the 2016 Shark Research Fishery
80 FR 74999	12/1/2015	Final Rule to Establish the Quotas and Opening Dates for the 2016 Atlantic Shark Commercial Fishing Season
2016		
81 FR 1376	1/12/2016	90-day Finding on a Petition To List the Oceanic Whitetip Shark as Threatened or Endangered Under the Endangered Species Act
81 FR 12606	3/10/2016	NOAA Fisheries Announces March 12 Closure of the Commercial Blacktip Shark, Aggregated Large Coastal Sharks, and Hammerhead Shark Management Groups in the Western Gulf of Mexico Sub-Region
81 FR 18541	3/31/2016	Retention Limit of Commercial Aggregated Large Coastal Shark and Hammerhead Shark Management Groups: Atlantic Region Reduced to 3 Sharks per Trip
81 FR 18980	4/1/2016	12-Month Finding on Petitions to List the Common Thresher Shark and Bigeye Thresher Shark as Threatened or Endangered Under the Endangered Species Act
81 FR 39017	6/15/2016	NOAA Fisheries Announces a Proposed Rule to Implement the ICCAT Recommendation Requiring Release of Live Porbeagle Sharks
81 FR 41934	6/28/2016	Notice of 12-Month Finding on Petition to List the Smooth Hammerhead Shark as Threatened or Endangered Under the Endangered Species Act
81 FR 44798	7/11/2016	Commercial Aggregated Large Coastal Shark and Hammerhead Shark Management Group Retention Limit Adjustment
81 FR 48731	7/26/2016	Removal of Vessel Upgrade Restrictions for Swordfish Directed Limited Access and Atlantic Tunas Longline Category Permits

The preferred alternatives in this document would provide recreational and commercial fisherman a better understanding of the fishing regulations and also help them better identify sharks, particularly dusky sharks and thus would improve compliance with those regulations. Specifically, recreational anglers would have additional training through an online quiz in order to retain sharks and be required to use circle hooks when fishing for sharks. The use of circle hooks by recreational anglers when fishing with natural baits and using a wire or heavy monofilament leader (*i.e.*, they are targeting sharks recreationally) or using natural baits when fishing for sharks in tournaments that bestow points, prizes, or awards for sharks could help increase post-release survival of dusky sharks that are caught unintentionally as bycatch. Pelagic longline fishermen would be required to leave minimal gear on any sharks that are released, let other fishermen in the area know when dusky sharks are encountered, and all pelagic longline,

bottom longline, and gillnet shark fishermen would have to attend a workshop on best practices for dusky sharks; these workshops are already required, but would be modified to have additional information regarding dusky sharks. Shark fishermen deploying bottom longline gear would also be required to use circle hooks. All of these preferred alternatives are designed to help decrease bycatch mortality of dusky sharks and minimize misidentified retention of dusky sharks, to the extent practicable. In doing so, these preferred alternatives have fewer negative socioeconomic impacts than other measures (*i.e.*, time/area closures) while still reducing fishing mortality for dusky sharks. Thus, the overall cumulative impacts of these preferred alternatives could have moderate to minor beneficial cumulative ecological impacts and minor adverse or neutral cumulative socioeconomic impacts. The following past and ongoing actions had or would have varying degrees of synergistic impacts on the human environment when considered in conjunction with Draft Amendment 5b to the 2006 Consolidated HMS FMP:

- Amendment 2 to the 2006 Consolidated HMS FMP (73 FR 35778; June 24, 2008; corrected in 73 FR 40658; July 15, 2008) changed quotas, retention limits, and authorized species for the directed commercial shark fishery. It also changed the authorized species in the recreational shark fisheries. Changes in Amendment 2 were determined to likely result in beneficial, cumulative ecological impacts for LCS, including dusky sharks, by decreasing fishing mortality. However, the final measures, including reductions in LCS quotas and trip limits, likely led to adverse cumulative socioeconomic impacts for commercial shark fishermen. Neutral cumulative socioeconomic impacts are expected when considered in conjunction with Draft Amendment 5b as dusky sharks have been prohibited in commercial and recreational shark fisheries since 2000, which was before Amendment 2 was implemented in 2008. There may be some minor adverse cumulative socioeconomic impacts to recreational shark fisheries if they are required to use circle hooks in conjunction to the changes in authorized species under Amendment 2.
- The Atlantic Pelagic Longline Take Reduction Plan (PLTRP) final rule (74 FR 23349, May 19, 2009) was intended to meet the statutory mandates and requirements of the Marine Mammal Protection Act (MMPA) through both regulatory and non-regulatory measures, including a special research area, gear modifications, outreach material, observer coverage, and captains' communications to encourage vessel operators (*i.e.*, captains) throughout the fishery to maintain daily communications with other local vessel captains regarding protected species interactions. The goal of these communications is to help identify and exchange information relevant to avoiding protected species bycatch, mainly pilot whales and Risso's dolphins. These measures in Draft Amendment 5b are meant to mirror some of the actions in the PLTRP final rule, such as increased training and fleet communication and relocation protocols to avoid dusky shark interactions. Thus, the PLTRP final rule may have beneficial cumulative ecological impacts in conjunction with Draft Amendment 5b if they result in decreased fishing mortality for sharks as well as pilot whales and Risso's dolphins. The management actions in the PLTRP final rule would likely lead to minor adverse cumulative socioeconomic impacts in the pelagic longline fishery when considered in conjunction with Draft Amendment 5b if dehooking

sharks or leaving less than 3 ft of gangion on released sharks or having to attend additional shark identification workshops results in some lost fishing opportunities.

- In 2011, NMFS published a rule that requires pelagic longline vessels fishing in the Gulf of Mexico to use weak hooks (76 FR 18653; April 5, 2011) in order to reduce bluefin tuna mortality in their spawning grounds. This requirement could have cumulative, beneficial impacts on larger dusky sharks caught on pelagic longline in the Gulf of Mexico if the dusky shark can straighten the hook and be released. Research on weak hook use in the pelagic longline fishery in the Atlantic showed that there was an observed reduction of 38.5 percent for the "sharks requiem" category; however, the sample size was extremely low for this group, and the comparison between the control and experimental treatments was not significant (D. Foster, NMFS, pers. comm.). However, the benefits could be mixed as the blue shark catch (n=144) on weak hooks in the Atlantic showed an increase of 40 percent that was bordering on significance (p value = 0.0545) (D. Foster, NMFS, pers. comm.). In the Gulf of Mexico, a similar experiment with weak hooks did not indicate any effect (increase or decrease) in shark catch rates (Foster and Bergmann, in prep.). The weak hook requirement likely resulted in neutral cumulative adverse socioeconomic impacts on fishermen in the Gulf of Mexico region because catch composition was not predicted to significantly change for target species, such as yellowfin tuna or swordfish. However, there was variability in yellowfin retention rates that were hypothesized to be due to variability in individual fishing practices (Foster and Bergmann, in prep). When Draft Amendment 5b is considered in conjunction with the weak hook rule, it is anticipated Draft Amendment 5b may have minor adverse cumulative socioeconomic impacts on the pelagic longline fishery if it results in some lost fishing opportunities due to commercial fishermen having to attend additional shark identification training. Alternatively, if weak hooks result in fewer catches of sharks in general, then the two rules together might have minor positive cumulative socioeconomic impacts on the pelagic longline fishery in the Gulf of Mexico as those fishermen would not be as likely to be selected to attend additional shark identification training. Impacts of having to dehook or leave less than 3 ft of gangion on any sharks may be mitigated by the straightening of the weak hooks, and therefore, neutral cumulative socioeconomic impacts to the pelagic longline fishery would be anticipated.
- In 2010 and 2011, NMFS implemented two rules in order to adopt ICCAT Recommendations 10-07, 10-08 and 11-08. These rules prohibited the possession and harvest of oceanic whitetip, smooth hammerhead, scalloped hammerhead, great hammerhead, and silky sharks. Additionally, in 2016, NMFS implemented a rule to require live release of porbeagle sharks pursuant to ICCAT Recommendation 15-06. Draft Amendment 5b would require that all sharks not retained be dehooked or released with less than 3 feet of gangion attached. Thus, Draft Amendment 5b and these ICCAT rules that either prohibit the possession of several shark species or require live release of porbeagle sharks could have minor beneficial cumulative ecological impacts as sharks not retained would be released in a way that could maximize their post-release survival. However,

neutral cumulative socioeconomic impacts are anticipated by the interaction of these ICCAT rules and Draft Amendment 5b as pelagic longline fishermen have not been able to retain dusky sharks since 2000, oceanic whitetip and hammerhead sharks since 2011, and silky sharks since 2012. Thus, having to release them or live porbeagle sharks should not affect fishing operations.

- On January 1, 2015, NMFS implemented Amendment 7 (79 FR 71510; December 2, 2014). The rule dramatically changed bluefin tuna management and affected the pelagic longline fishery, which interacts with dusky sharks. In particular, Amendment 7 allocated U.S. bluefin tuna quota among domestic fishing categories; implemented measures applicable to the pelagic longline fishery, including Individual Bluefin Quotas (IBQs), two new Gear Restricted Areas, closure of the pelagic longline fishery when annual bluefin tuna quota is reached, elimination of target catch requirements associated with retention of incidental bluefin tuna in the pelagic longline fishery, mandatory retention of legal-sized bluefin tuna caught as bycatch, expanded monitoring requirements, including electronic monitoring via cameras and bluefin tuna catch reporting via VMS, and transiting provisions for pelagic longline and bottom longline vessels. The rule also had impacts on the recreational fishery by changing the allocation of the Angling category Trophy South subquota for bluefin tuna for the Gulf of Mexico. Amendment 7 could have minor to moderate beneficial ecological cumulative impacts on dusky sharks in conjunction with Draft Amendment 5b if changes in the pelagic longline fleet and fishing also result in reduced dusky shark interactions. Amendment 7 is not expected to have any additional ecological impacts on dusky sharks in the recreational shark fishery in combination with Draft Amendment 5b as re-allocation of recreational sub-quotas for bluefin tuna is not anticipated to affect interaction rates of recreational anglers with dusky sharks. In addition, there are no anticipated synergistic cumulative socioeconomic impacts anticipated from Amendment 7 when considering the currently preferred alternatives in Draft Amendment 5b.

In addition, reasonably foreseeable future actions that could result in additional incremental cumulative impacts include: changes in pelagic longline fishing as fishermen adapt to Atlantic bluefin tuna management measures under Amendment 7; future shark research fisheries that continue to interact with dusky sharks; and Amendment 10 that would modify essential fish habitat for dusky and other shark species. These are measures that, while not all directly related to dusky sharks, could be implemented in other rulemakings and affect participants in recreational shark and/or commercial fisheries in conjunction with the preferred alternatives in this draft amendment. Such actions would have varied effects on fishermen that interact with dusky sharks in the commercial and recreational shark fisheries. Any later actions that reduce fishing opportunities could be expected to have cumulative, adverse, socioeconomic impacts on such fishermen in conjunction with Amendment 5b to the 2006 Consolidated HMS FMP, such as the reinitiation of Biological Opinions for several HMS fisheries (please see "Reinitiation of ESA Section 7 Consultation in HMS Fisheries" in Section 3.10).

NMFS also recently determined that the Northwest Atlantic and Gulf of Mexico population of dusky sharks constitutes a distinct population segment but does not warrant a listing as a

threatened or endangered distinct population segment under the ESA at this time. This determination will not change the status quo for Northwest Atlantic and Gulf of Mexico population of dusky sharks (*i.e.*, they are not listed as threatened or endangered under the ESA); therefore, NMFS does not anticipate this determination will have any impacts on commercial or recreational fishermen that interact with dusky sharks.

While NMFS has evaluated the cumulative ecological and socioeconomic impacts of these preferred alternatives, NMFS also evaluated how other non-HMS fisheries may be impacted by the preferred alternatives. In particular, NMFS evaluated other fisheries for which commercial fishermen and recreational shark fishermen may currently have permits. One note is that non-HMS recreational fisheries do not have a general federal fishing permit for private anglers; while there are charter/headboat permits in the non-HMS fisheries, there is no analogous Angling permit that is in operation in the non-HMS fisheries as there is for HMS recreational fisheries. Therefore, the overlap in permits for recreational fisheries was not possible; however, the overlap of non-HMS charter/headboat is considered with other commercial permits in Table 5.2. In addition, NMFS determined commercial and recreational fishermen's ability to enter other fisheries, and the subsequent impacts those fisheries might experience as a result of redirected commercial and recreational fishing effort.

The overlap of the commercial permits and non-HMS charter/headboat permits is shown in Table 5.2. The table shows the non-HMS permits held by vessels that hold Southeast federal issued vessel permits, Atlantic Tunas Longline category permits, and shark directed or shark incidental vessel permits as of December 14, 2015 (please note that the HMS permit numbers may differ from other chapters due to the date the permit data was compiled). NMFS used vessels issued Atlantic Tunas Longline category permit in conjunction with a shark directed or incidental permit to identify the universe of pelagic longline vessels that may be affected by Draft Amendment 5b. NMFS also evaluated the ability of shark fishermen to move into other Southeast fisheries (*i.e.*, Gulf of Mexico reef fish, dolphin/wahoo, mackerel, and South Atlantic snapper/grouper fisheries). An overview of each fishery is listed below, and the cumulative ecological and socioeconomic impacts of the preferred alternative, including impacts of any redistributed effort to other fisheries, are discussed below.

Table 5.2 Overlap of HMS Atlantic Tunas Longline category, Shark Directed, and Shark Incidental vessel permits with other Southeast federally-issued non-HMS vessel permits.

State	Shark-Directed	Shark-Incidental	Atl Tunas Longline	GOM Reef Fish	Atl Dolphin/Wahoo	King Mackerel	Gillnet King Mackerel	Spanish Mackerel	*Atl Snapper/Grouper	Golden Tilefish Endorse	**Non-HMS charter
CT		1	1								
DE	1		1		1						1
FL	50	60	110	23	89	27		50	16	5	59
LA	1	29	30	2	6	2		1			
MA	2	4	6		4						
MD	1	2	3		3			1			3
ME	1	3	4		2			1			
NC	13	3	16		15	7		11	3		2
NJ	18	18	36		24	8		11	1		
NY	9	8	17	1	13			1			3
PA		1	1		1						
RI	1		1		1						
SC	2	3	5		4				1		
TX	1	6	7	4	1	3					6
VA		2	2								
2015 Total	**100**	**140**	**240**	**30**	**164**	**47**		**76**	**21**	**5**	**74**

*South Atlantic 225 lb Trip Limit Snapper / Grouper & South Atlantic Unlimited Snapper / Grouper combined

**Atlantic Charter / Headboat for Dolphin / Wahoo open access; South Atlantic Charter / Headboat for Pelagic Fish open access; South Atlantic Charter / Headboat for Snapper / Grouper open access; Gulf of Mexico Charter / Headboat for Reef Fish limited access; & Gulf of Mexico Charter / Headboat for Pelagic Fish limited access combined

Gulf of Mexico Reef Fish Fishery

The Gulf of Mexico Fishery Management Council (Gulf Council) originally established the Gulf of Mexico Reef Fish FMP in 1984 (GMFMC 1984). Numerous amendments and framework actions have been made to this plan. The species managed are snappers (Red Snapper, Vermilion, Lane, Gray (Mangrove), Mutton, Yellowtail, Cubera, Blackfin, Queen, Silk, and Wenchman), groupers (shallow water: Gag, Red, Black, Yellowfin, Scamp, and Yellowmouth; deep water: Yellowedge, Snowy, and prohibited Goliath and Nassau), tilefish (Tilefish (Golden), Blueline Tilefish, Goldface Tilefish), hogfish, Gray Triggerfish, Greater Amberjack, Lesser Amberjack, Banded Rudderfish, and Almaco Jack. Red Drum is part of the complex, but prohibited in federal waters.

The Gulf of Mexico Reef Fish FMP authorizes the use of longline, hook and line, handline, bandit gear, rod and reel, buoy gear, spear, powerhead, cast net, and trawl. Gillnets are allowed in certain areas during certain time periods; however, while pelagic longline gear is not a primary gear in this fishery, bottom longline gear is a primary gear. However, the Gulf of Mexico reef fish fishery already has regulations in place regarding gears, such as requirements to use non-stainless steel circle hooks, VMS, dehooking devices when fishing for reef fish, hook limits, and bait restrictions. Thus, changes due to Draft Amendment 5b, such as circle hooks when using bottom longline gear, and releasing sharks not landed with a dehooker or attending a Safe Handling and Release Workshop, which is already required for the fleet, are not anticipated to affect this commercial fishery in terms of socio-economic impacts. Overall, they would add to mortality reductions for all species, and therefore, could have minor beneficial ecological impacts. There are also ACLs and ACTs for the commercial and recreational fisheries, with size limits for some species and fishing seasons. More information on the reef fish fishery can be found at http://gulfcouncil.org/fishing_regulations/Recreational%20%20Regulations.pdf and http://gulfcouncil.org/fishing_regulations/CommercialRegulations.pdf.

A Gulf of Mexico commercial reef fish vessel permit allows the harvest and sale of all reef fish listed in the Reef Fish FMP under quota (where applicable) and in excess of the bag limits (where applicable), except goliath grouper (all harvest prohibited), Nassau grouper (all harvest prohibited), red snapper, grouper, and tilefish. Fishermen wanting to harvest and sell red snapper, grouper, and tilefish must also possess individual fishing quota (IFQ) shares. Issuance of new reef fish permits is under a moratorium. Access to these fisheries is limited to existing permits holders. However, existing permits are transferable. As of December 14, 2015, Atlantic Tunas Longline category permit holders (that also possessed either a shark directed or incidental vessel permit) possessed 30 Gulf of Mexico reef fish permits (Table 5.2). The highest number of Gulf of Mexico reef fish permits held by pelagic longline permitted vessels are in Florida, which represent approximately 77 percent of the total number of Gulf of Mexico reef fish permits held by commercial pelagic longline permit holders. However, since pelagic longline gear is not a gear commonly used in the reef fish fishery, and the proposed bottom longline measures are similar to what is currently in existence in the reef fish fishery, the changes under Draft Amendment 5b are not anticipated to affect the commercial Gulf of Mexico reef fish fishery.

Red snapper quota shares are freely transferable to any other reef fish permit holders during the first five years following implementation of the IFQ program and then to anyone thereafter. Pelagic longline permit holders that also possess a reef fish permit, but did not receive an IFQ allocation, will likely find that it would be costly to attain such an allocation. The Gulf Council set the commercial and recreational red snapper quotas for 2015-2017 in a final rule (80 FR 24832; May 1, 2015) that also announced the closure dates for the red snapper recreational sector components (private angling and for hire components) in the Gulf of Mexico in the final rule.

Gulf of Mexico commercial grouper and tilefish fishermen in December 2008 approved a referendum that allowed the Gulf Council to approve Amendment 29 to the Reef Fish FMP in January 2009. The final rule was published on August 31, 2009 (74 FR 44732), and established a commercial IFQ management program for grouper and tilefish, which became effective on January 1, 2010. As with the red snapper IFQ program, if pelagic longline permit holders that also possess a reef fish permit did not receive an IFQ allocation, they will likely find that it would be costly to attain such an allocation.

Some recreational fishing permits for Gulf of Mexico charter/headboat fisheries are under a moratorium for new permits. Charter vessel/headboat permits for coastal pelagics and reef fish have been under a moratorium since June 16, 2003, although private anglers may still retain fish under bag limits, fishing seasons, minimum size requirements, bait and gear restrictions as well as limitations on landing conditions. However, there is no federal private angling fishing permit for this fishery. More information can be found at: http://gulfcouncil.org/fishing_regulations/Recreational%20%20Regulations.pdf. Such restrictions make redistribution of effort from recreational shark fishermen often difficult for certain sectors of the recreational fleet. In terms of impacts of Draft Amendment 5b on the recreational reef fish fishery, if the anglers also obtain a shark endorsement on their HMS permit, they would have to use circle hooks when fishing with natural baits and using a wire or heavy monofilament leader (*i.e.*, they are targeting sharks recreationally) or using natural baits when fishing for sharks in tournaments that bestow points, prizes, or awards for sharks. Circle hooks increase post-release survival of many species not retained, potentially resulting in moderate beneficial cumulative ecological impacts. It is anticipated that the change in hook type for recreational anglers could be a minor adverse cumulative socio-economic impact, however, it is really meant to be required when fishers are targeting sharks, thus, resulting in minimal adverse socioeconomic cumulative impacts.

Recreational fishing for red snapper is currently managed with a 16-inch TL minimum size limit, 2-fish bag limit, and a season beginning on June 1 and ending when the recreational quota is projected to be caught. Other reef fish fishery management measures that affect red snapper fishing include permit requirements for the commercial and for-hire sectors as well as season-area closures (GMFMC, 2015a). Recently, the Gulf Council has made a number of changes in the recreational reef fish fisheries.

The Gulf Council published a final rule (80 FR 22422; April 22, 2015) for Amendment 40 of the Reef Fish FMP that established two components within the recreational sector for Gulf of Mexico red snapper (a Federal charter vessel/headboat (for-hire) component and private angling component) with a 3-year sunset provision; allocated the red snapper recreational quota and ACT

between the components; and established separate red snapper season closure provisions for the two components.

A framework action developed by the Gulf Council and implemented by NMFS held back the percentage of the 2016 commercial quota necessary to implement Amendment 28 in 2016 (4.9 percent (352,000 pounds) of the 2016 red snapper commercial quota in the Gulf of Mexico) (80 FR 73999, November 27, 2015; GMFMC, 2015b). NMFS issued a final rule on April 28, 2016 (81 FR 25576), that implemented Amendment 28; this Amendment revised the Gulf red snapper allocation to 48.5 percent of the stock ACL to the commercial sector and 51.5 percent of the stock ACL to the recreational sector. In addition, the final rule revised the commercial quota to 6.768 million lb (3.070 million kg) and 6.664 million lb (3.023 million kg) for the 2016 and 2017 fishing years and the recreational quota to 7.192 million lb (3.262 million kg) and 7.076 million lb (3.210 million kg) for the 2016 and 2017 fishing years. The revised commercial quota for 2016 reflects the portion of the quota held back on January 1, 2016. For the recreational sector, the ACT is set 20 percent less than the recreational quota and result in ACTs of 5.754 million lb (2.610 million kg) for 2016 and 5.661 million lb (2.568 million kg) for 2017. The Gulf Council was also considering regional recreational management for red snapper under Amendment 39 (GMFMC, 2015c), but this amendment is currently on hold.

In April 2015, the Gulf Council considered changes to the bag limits for red grouper (80 FR 18552; April 7, 2015) and considered changes for recreational size limits and seasons for gag and changing the recreational size limits for black grouper through a framework action as of August 2015. On May 25, 2016 (81 FR 24038) NMFS published a final rule that revised the gag recreational closed season to be from January 1 to May 31, annually. In addition, the final rule increased the recreational minimum size limit in Gulf Federal waters for both species to 24 inches (61.0 cm), TL, to be consistent with the Federal waters of the South Atlantic and state waters off Monroe County, Florida. On July 26, 2016 (81 FR 48728) NMFs released a proposed rule to adjust the allowable red grouper harvest to achieve optimum yield based upon an updated Gulf red grouper stock assessment.

A population assessment for greater amberjack in 2012 indicated that they are overfished and experiencing overfishing. The Gulf Council implemented management measures through a framework action that revised the commercial and recreational ACLs and ACTs, the commercial trip limit, and the recreational minimum size limit for greater amberjack in the Gulf of Mexico (80 FR 75432; December 2, 2015). Therefore, as of January 4, 2016, NMFS decreased the total annual catch limit from 1,780,000 pounds whole weight to 1,720,000 pounds whole weight and set the commercial annual catch limit at 464,400 pounds whole weight and the commercial quota at 394,740 pounds whole weight while reducing the commercial trip limit from 2,000 pounds whole weight to 1,500 pounds gutted weight. NMFS also set the recreational annual catch limit at 1,255,600 lb whole weight and the recreational quota at 1,092,372 pounds whole weight, and increase the minimum recreational size limit from 30 inches fork length to 34 inches fork length.

On May 10, 2016 (81 FR 28829), the NMFS Southeast Region in collaboration with the Gulf of Mexico Fishery Management Council announced its intent to prepare a DEIS to describe and analyze a range of alternatives for management actions to be included in Amendment 42 to the FMP for the Reef Fish Resources of the Gulf of Mexico (Amendment 42). Amendment 42 will

consider an allocation-based management program for the headboat component of the reef fish recreational fishery in the Gulf of Mexico.

On May 17, 2016 (81 FR 30517), the NMFS Southeast Region in collaboration with the Gulf of Mexico Fishery Management Council announced its intent to prepare a DEIS to describe and analyze a range of alternatives for management actions to be included in Amendment 41 to the FMP for the Reef Fish Resources of the Gulf of Mexico (Amendment 41). Amendment 41 will consider management approaches for the harvest of red snapper from vessels with a Gulf Charter Vessel/Headboat Permit for Reef Fish that do not participate in the Southeast Region Headboat Survey.

The Gulf Council also had public hearings for Amendment 43 of the Reef Fish FMP to the Gulf of Mexico in 2016. This amendment considers setting a management boundary between the west Florida stock of hogfish, which is located entirely in the Gulf of Mexico jurisdiction, and the east Florida/Florida Keys stock, which occurs primarily in the south Atlantic but extends partially into the Gulf Council's jurisdiction in the Florida Keys. The draft amendment also looks at defining overfished and overfishing thresholds, setting an annual catch limit and increasing both the commercial and recreational minimum size limit for hogfish. The Gulf Council has selected a preferred alternative that would raise the minimum size limit of hogfish to 16 inches fork length.

Given the limited access and short fishing seasons of the commercial reef fish fishery in the Gulf of Mexico and restrictions and reductions occurring in the recreational fisheries, it is not likely that commercial HMS fishermen would be able to compensate all potential losses from reductions in fishing opportunities proposed for sharks solely by transferring effort to the Gulf of Mexico reef fish fishery. However, pelagic longline is not a primary gear for reef fish, so it is not anticipated that much pelagic longline effort would be redistributed into the reef fish fishery; as many shark bottom longline fishery already fish in the reef fish fishery, redistribution of effort from the shark bottom longline fishery is also not anticipated.

Dolphin/Wahoo Fishery

Under Amendment 18 Coastal Migratory Pelagic Resources FMP, the Gulf Council removed dolphin from the Coastal Migratory Pelagic Resources FMP as of January 30, 2012 (76 FR 82058; December 29, 2011). So there are no regulations currently controlling the harvest of these species in the Gulf of Mexico. Prior to this, dolphin was included in the management unit under the Coastal Migratory Pelagic Resources FMP, and a charter/headboat vessel permit was required to fish for or possess dolphin in the Gulf of Mexico. A moratorium for new charter/headboat vessel permits has been in effect since June 16, 2003.

There have been no formal stock assessments for dolphin or wahoo. The status of wahoo is considered unknown, and time-series data seem to indicate neither a decline in stock abundance nor a decrease in mean size of individual dolphin fish (SAFMC 1998). However, a precautionary approach to management was taken in 2003 since the dolphin and wahoo tend to aggregate, they are economically valuable before the age of maturity, and there is high interannual variability in these stocks due to environmental factors.

In the South Atlantic, historically, the dolphin/wahoo fishery was a recreational fishery (SAFMC 2003). However, during the 1990s, commercial landings in the Atlantic Ocean increased, due in part to an increasing number of pelagic longline vessels targeting dolphin (SAFMC 2003). As a result, the South Atlantic Fishery Management Council in cooperation with the Mid-Atlantic Fishery Management Council and New England Fishery Management Council developed a comprehensive FMP for both dolphin and wahoo in the Atlantic Ocean (SAFMC 2003). This FMP was approved in December of 2003. The final rule implementing the regulations in this FMP was published on May 27, 2004 (69 FR 30235). Owing to the significant importance of the dolphin/wahoo fishery to the recreational fishing community in the Atlantic, the overall goal of the FMP was to adopt a precautionary and risk-averse approach to management that set harvest limits based on the status quo at that time, which was average catch and effort levels from 1993 to 1997 (SAFMC 2003). These limits were implemented to deter shifts in the historical pelagic longline fisheries for sharks, tunas, and swordfish or expansions into nearshore coastal waters to target dolphin, which could create user conflicts and possible localized depletion in abundance (SAFMC 2003).

As such, the dolphin/wahoo fishery is an open access fishery for now where people can purchase a vessel, dealer, or operator permit in the South Atlantic. Operators of commercial vessels, charter vessels, and headboats in the South Atlantic that fish south of 39° N. Lat. are required to have a federal vessel permit for dolphin/wahoo and must have and display operator permits. There is currently no trip limit for dolphin for a vessel with a commercial federal vessel permit, except such changes are being considered as described below. However, there is a 500 pound commercial trip limit for wahoo for vessels without such a permit. For commercially permitted vessels fishing north of 39° N. Lat. that do not have a federal commercial vessel permit for dolphin/wahoo, there is a trip limit of 200 pounds combined of dolphin and wahoo. In addition, there is a 20 inch fork length minimum size limit for dolphin off the coasts of South Carolina, Georgia and Florida with no size restrictions elsewhere, and pelagic longline fishing for dolphin and wahoo is prohibited in areas closed to the use of such gear for HMS. Dolphin/wahoo longline vessels must also comply with sea turtle protection measures. ACLs and AMs for dolphin and wahoo were implemented in 2012 (77 FR 15916; March 12, 2012) as was a prohibition on the recreational bag limit sales of dolphin harvested from for-hire vessels. In 2014, under Amendment 5 Coastal Migratory Pelagic Resources FMP, the ACLs and AMs for dolphin/wahoo were revised in a final rule (79 FR 32878; June 9, 2014) for the commercial and recreational sectors of dolphin and wahoo, including updates the framework procedures for the FMP. In addition, Amendment 5 Coastal Migratory Pelagic Resources FMP revised the ABC values and recreational ACTs for dolphin and wahoo.

The recreational dolphin fishery has the same minimum size restrictions as the commercial fishery, but there is no federal private angling fishing permit in this fishery. In addition, there is a recreational bag limit of 2 wahoo per person per day and 10 dolphin per person per day or 60 dolphin per vessel per day, whichever is less (headboats are excluded from the vessel limit). There is a prohibition on recreational sale of dolphin and wahoo caught under the bag limit unless the seller holds the necessary commercial permits. In terms of impacts of Draft Amendment 5b on the dolphin wahoo recreational fishery, if the anglers also obtain a shark endorsement on their HMS permit, they would have to use circle hooks when fishing with natural baits and using a wire or heavy monofilament leader (*i.e.*, they are targeting sharks

recreationally) or using natural baits when fishing for sharks in tournaments that bestow points, prizes, or awards for sharks. Circle hooks could increase post-release survival of many species not retained, potentially resulting in moderate beneficial cumulative ecological impacts. It is anticipated that the change in hook type for recreational anglers could be a minor adverse cumulative socio-economic impact, however, it would be required when fishers are targeting sharks, thus, resulting in minimal adverse socioeconomic cumulative impacts.

The authorized gears for dolphin and wahoo fishery are hook-and-line gear including manual, electric, and hydraulic rods and reels; bandit gear; handlines; longlines; and spearfishing (including powerheads) gear. Pelagic longline vessels permitted in the shark and swordfish fisheries are subject to the hook size regulations regarding the HMS fishery, which has impacted their ability to simultaneously fish for dolphin by attaching smaller-hooked gangions directly to their pelagic longline gear. These fishermen would have to adhere to the safe release of all sharks not landed, fleet wide communication of dusky shark interactions and attending Safe Handling and Release Workshops, as is currently required for the fleet.

As of January 2014 (78 FR 78779; December 27, 2013), headboat vessels fishing in the South Atlantic for snapper-grouper, dolphin and wahoo, and coastal migratory pelagics were required to submit weekly electronic fishing records to the Southeast Fisheries Science Center Science (SEFSC), and the rule prohibited headboats from continuing to fish if they are delinquent in submitting reports. An analogous rule for the reef fish and coastal migratory pelagics in the Gulf of Mexico was implemented in March 5, 2014 (79 FR 6097; February 3, 2014). The Gulf and South Atlantic Councils are currently considering revisions to these requirements.

The commercial fishery for dolphin was closed in the Atlantic for the first time in management history on June 30, 2015, after landings reached 1,098,081 lb ww, which almost 94 percent of its 2015 ACL (http://sero.nmfs.noaa.gov/sustainable_fisheries/acl_monitoring/commercial_sa/index.html). This left many fishermen, including those in the Mid-Atlantic and many HMS fishermen, without having access to the seasonal fishery. As of December 4, 2015, recreational harvest was 5,537,451 lb ww (http://sero.nmfs.noaa.gov/sustainable_fisheries/acl_monitoring/recreational_sa/index.html).

Like dolphin, the recreational landings of wahoo account for a larger proportion of the total harvest in the Gulf of Mexico and Atlantic Ocean. As of December 4, 2015, the total commercial harvest in the Atlantic amounted to 56,404 lb ww (http://sero.nmfs.noaa.gov/sustainable_fisheries/acl_monitoring/commercial_sa/index.html), compared to 798,281 lb ww harvested by recreational anglers (http://sero.nmfs.noaa.gov/sustainable_fisheries/acl_monitoring/recreational_sa/index.html).

Currently there is also a non-binding 1.5 million pound (or 13 percent of the total harvest) cap on commercial landings for dolphin. Should the catch exceed this level, the South Atlantic Council would review the data and evaluate the need for additional regulations, which may be established through a framework action. The South Atlantic Council approved the Regulatory Amendment 1 during its December 2015 meeting to establish commercial trip limits to help extend the dolphin fishing season along the Atlantic coast, and on June 30, 2016 (81 FR 42625) NMFS published a

proposed rule that, if implemented, would establish a commercial trip limit for Atlantic dolphin for vessels with a Federal commercial permit for Atlantic dolphin and wahoo to reduce the chance of an in-season closure of the dolphin commercial sector. The Council is also considering Amendment 10 that could change commercial gear sector allocations for (longline and hook and line); make the commercial dolphin wahoo permit limited entry, establish a common pool allocation or reserve category allocation; consider permanent or temporary allocation shifts between commercial and recreational sectors; and consider a circle hook requirement for the dolphin fishery. Scoping for the Amendment is anticipated in August 2016. This amendment is, in part, in response to changes in bluefin tuna fishery management under Amendment 7 to the HMS Consolidated FMP (http://safmc.net/sites/default/files/meetings/pdf/Council/2015/12-2015/T8-DW/A6_DWAmend10_WP_201512.pdf).

NMFS implemented Amendment 7 to the FMP for the Dolphin and Wahoo Fishery off the Atlantic States (Dolphin and Wahoo FMP) and Amendment 33 to the FMP for the Snapper-Grouper Fishery of the South Atlantic Region (Snapper-Grouper FMP) (Amendments 7/33) on January 27, 2016. This final rule published on December 28, 2015 (80 FR 80686) and revised the landing fish intact provisions for vessels that lawfully harvest dolphin, wahoo, or snapper-grouper in or from Bahamian waters and return to the U.S EEZ. The U.S. EEZ as described in this final rule refers to the Atlantic EEZ for dolphin and wahoo and the South Atlantic EEZ for snapper-grouper species. The purpose of this final rule was to improve the consistency and enforceability of Federal regulations with regards to landing fish intact provisions for vessels transiting from Bahamian waters through the U.S. EEZ and to increase the social and economic benefits related to the recreational harvest of these species. .

On February 4, 2016 (81 FR 5979), NMFS announced the establishment of a control date of June 30, 2015, that the South Atlantic Fishery Management Council may use if it decides to create restrictions limiting participation in the dolphin commercial sector of the dolphin and wahoo fishery in the Atlantic exclusive economic zone. Anyone entering the sector after the control date will not be assured of future access should a management regime that limits participation in the sector be prepared and implemented.

The dolphin/wahoo fishery is extremely seasonal in nature. This seasonality would influence the number of displaced HMS fishermen's ability to direct effort towards dolphin and wahoo. As of December 14, 2015, 164 dolphin/wahoo permit holders also have Atlantic Tunas Longline category permits (Table 5.2). The Atlantic dolphin/wahoo fishery has the greatest overlap with the HMS pelagic longline fleet with 68 percent of the non-HMS vessels permits belonging in the Atlantic dolphin/wahoo fishery; these fish are typically not commercially harvested in bottom longline or gillnet gear. Eighty-nine of these dolphin/wahoo permit holders are from the state of Florida (Table 5.2), which is also the greatest level of overlap within any state with any non-HMS fishery. Because the dolphin/wahoo fishery is an open access fishery, pelagic longline fishermen who do not currently have a dolphin/wahoo permit would be able to enter the fishery in the south Atlantic, at least for now. Fishermen in the Gulf of Mexico could switch to the dolphin/wahoo fishery without trip limits or any permit requirements. However, gear modification may be difficult since dolphin and wahoo are pelagic in nature, and pelagic longline gear requires the use of 18/0 (with an offset not to exceed 10°) or 16/0 non-offset circle hooks. These larger hooks would make it difficult to catch small dolphin and wahoo, thus limiting catch

to larger individuals. In addition, because of the seasonal nature of this fishery, directed fishing year-round would be difficult.

Spanish mackerel

In the South Atlantic and Gulf of Mexico, fisheries for Spanish mackerel (*Scomberomorus maculatus*) are important for commercial participants who also engage in pelagic longline fisheries. Fisheries are managed jointly by the South Atlantic Fishery Management Council and the Gulf of Mexico Fishery Management Council under the FMP for Coastal Migratory Pelagic Resources and its amendments (SAFMC 1982). Since then, a number of Amendments and regulatory actions have been taken on this joint FMP.

In the Atlantic, there is a northern (Georgia to New York) and southern zone (east coast of Florida to Dade-Monroe County). Catch restrictions vary by month and are dependent on the percentage of each zones allocation that is actually harvested. The Gulf of Mexico consists of one management group. The most recent stock assessments for South Atlantic and Gulf of Mexico Spanish mackerel stocks were completed in 2012 and concluded that the populations are not overfished or not experiencing overfishing (SEDAR 2012).

The commercial and recreational size limit of 12 in fork length is in both the South Atlantic and Gulf of Mexico regions. The recreational fishery has a 15 fish per person trip limit in both the South Atlantic and Gulf of Mexico.

Authorized gear for Spanish mackerel in the South Atlantic include automatic reel, bandit gear, rod and reel, cast net, run-around gill nets, and stab nets; in the Gulf of Mexico, all gears are legal except drift and long gillnets and purse seines. However, there is an incidental catch allowance for vessels with purse seines onboard. A minimum size of 3.5 inches (8.9 cm) stretched mesh is required for all run-around gill nets and soak time is limited to one hour. The commercial fishing year in the south Atlantic is from March 1 through the end of February and is April 1 through March 31 in the Gulf of Mexico. A federal vessel permit is required for the commercial fishery; however, it is currently an open access fishery in both the South Atlantic and Gulf of Mexico regions. The income requirement for the South Atlantic commercial federal permit was removed in 2014. Federal charter vessel and headboats fishing permits are required for mackerels South Atlantic and Gulf of Mexico regions; however, new permits in the Gulf of Mexico region have been under a moratorium effective June 16, 2003. There is no federal private angling fishing permit in the Atlantic or Gulf of Mexico for this fishery.

Gillnets were the predominant gear type for Spanish mackerel prior to the net ban in Florida (NMFS 2004). As of 2003, approximately 60 percent of the overall catch came from cast nets and approximately 25 percent are caught with gillnets, the remainder being caught with other authorized gears (NMFS 2004). In Florida, the majority of the effort is still in state waters, where gillnets are not allowed (NMFS 2004). Some netting occurs in federal waters; however, the cast net is used more often (NMFS 2004). Fishing effort follows the fish migrating north to waters off North Carolina in the summer and then following the fish back to Florida during the winter months (NMFS 2004). Sinknets are the primary gear type used off of North Carolina (NMFS 2004).

The final rule for Amendment 18 to the Fishery Management Plan for the Coastal Migratory Pelagic Resources in the Gulf of Mexico and Atlantic Region (76 FR 82058; December 29, 2011) established the ACLs, ACTs, and AMs for Spanish mackerel. These ACLs and ACTs were modified in Framework Amendment 1 (79 FR 69058; November 20, 2014) based on the 2012 stock assessments for these stocks. The final rule set the ACL for Atlantic Migratory group Spanish mackerel to 6.063 million lb (2.750 million kg) and allocated the revised ACL based on the previously determined allocation distribution of 55 percent to the commercial sector and 45 percent to the recreational sector. The final rule also revised the adjusted commercial quota for Atlantic migratory group Spanish mackerel from 2.88 million to 3.08 million lb, based on the increase of the commercial ACL (commercial quota) for Atlantic migratory group Spanish mackerel. The adjusted quota is the quota for Atlantic migratory group Spanish mackerel reduced by an amount calculated to allow continued harvests of Atlantic migratory group Spanish mackerel at the rate of 500 lb per vessel per day for the remainder of the fishing year after the adjusted quota is reached. Total commercial harvest is still subject to the ACL and an in-season closure when landings are projected to reach the ACL. The final rule also set the recreational ACL to 2.727 million lb and set the recreational ACT to 2.364 million lb.

This final rule also increased the stock ACL for Gulf migratory group Spanish mackerel to 12.7 million lb for the 2014–2015 fishing year, 11.8 million lb for the 2015–2016 fishing year, and 11.3 million lb for the 2016–2017 fishing year and subsequent fishing years.

As of January 2014 (78 FR 78779; December 27, 2013), headboat vessels fishing in the South Atlantic for snapper-grouper, dolphin and wahoo, and coastal migratory pelagics were required to submit weekly electronic fishing records to the Southeast Fisheries Science Center Science (SEFSC), and the rule prohibited headboats from continuing to fish if they are delinquent in submitting reports. An analogous rule for the reef fish and coastal migratory pelagics in the Gulf of Mexico was implemented in March 5, 2014 (79 FR 6097; February 3, 2014). The Gulf and South Atlantic Councils are currently considering revisions to these requirements.

The final rule for Amendment 20B to the FMP (80 FR 4216, January 27, 2015) created separate quotas for the northern and southern zones for Atlantic migratory group Spanish mackerel. The boundary between the zones is a line extending from the South Carolina/ North Carolina state line. The commercial ACL is split between the zones based on landings from the 2002/ 2003–2011/2012 fishing years. For Spanish mackerel, the formula results in an allocation of 19.9 percent for the northern zone and 80.1 percent for the southern zone. Transfer of quota between zones is allowed through a request to NMFS initiated by either North Carolina (northern zone) or Florida (southern zone). The recreational ACLs for Atlantic migratory group Spanish mackerel remained unchanged.

In a final rule implementing a second Framework Amendment (40936 FR 80; July 14, 2015), NMFS streamlined the commercial trip limit system for the Atlantic migratory group Spanish mackerel by eliminating the unlimited weekday Spanish mackerel trip limit in Federal waters off the eastern coast of Florida. The final rule retained the adjusted quota, which provides a buffer to help prevent the commercial sector from exceeding the commercial ACL. This final rule established a commercial trip limit of 3,500 lb for Spanish mackerel in Federal waters offshore of South Carolina, Georgia, and eastern Florida, which is the area established as the southern

zone by the final rule implementing Amendment 20B to the FMP. For Northern zone, the trip limit is 3,500 pounds per vessel/day while the fishery is open. When 75 percent of the adjusted southern zone quota (2,417,330 lb) is met or is projected to be met, the commercial trip limit is reduced to 1,500 lb. When 100 percent of the adjusted southern zone commercial quota is met or projected to be met, the commercial trip limit is reduced to 500 lb until the end of the fishing year or until the southern zone commercial quota is met or is projected to be met, at which time the commercial sector in the southern zone would be closed to harvest of Spanish mackerel. There are no trip limits in the Gulf of Mexico region commercial Spanish mackerel fishery.

Other minor rules include a final rule (79 FR 34246; June 16, 2014) for Amendment 20A that restricted sales of Spanish mackerel caught under the bag limit (those fish harvested by vessels that do not have a valid commercial vessel permit for king or Spanish mackerel and are subject to the bag limits) and removed the income qualification requirements for Spanish mackerel commercial vessel permits. In addition, in a framework action in November, 2014, NMFS published a final rule (FR 79 68802; November 19, 2014) that modified the restrictions on transfer-at-sea and gillnet allowances for Atlantic migratory group Spanish mackerel to minimize dead discards of Spanish mackerel.

Some pelagic longline vessels that have Atlantic Tunas Longline category permits also have Spanish mackerel permits (76 vessels; Table 5.2). However, Spanish mackerel is typically not targeted with pelagic longline gear. Because the commercial fishery for Spanish mackerel is not limited access and the stocks are healthy, this could be a fishery for participants to engage in fishermen can change gears easily. In terms of impacts of Draft Amendment 5b on the Spanish mackerel recreational fishery, if the anglers also obtain a shark endorsement on their HMS permit, they would have to use circle hooks when fishing with natural baits and using a wire or heavy monofilament leader (*i.e.*, they are targeting sharks recreationally) or using natural baits when fishing for sharks in tournaments that bestow points, prizes, or awards for sharks. Circle hooks could increase post-release survival of many species not retained, potentially resulting in moderate beneficial cumulative ecological impacts. It is anticipated that the change in hook type for recreational anglers could be a minor adverse cumulative socio-economic impact, however, it would be required when fishers are targeting sharks, thus, resulting in minimal adverse socioeconomic cumulative impacts.

King Mackerel

Commercial fisheries for king mackerel (*Scomberomorus cavalla*) are an important source of revenue for participants in the Atlantic and Gulf of Mexico regions. Similar to Spanish mackerel, king mackerel is managed by jointly by the South Atlantic Fishery Management Council and the Gulf of Mexico Fishery Management Council under the Coastal Migratory Pelagic Resources FMP (SAFMC 1982).

A stock assessment was conducted for king mackerel in 2013. The assessment determined that the Atlantic and Gulf of Mexico migratory groups of king mackerel are not overfished and not experiencing overfishing (SEDAR 2014a, b). Permits in the commercial fishery are limited access and there is currently a permit moratorium in place. The minimum size for king mackerel is 24 inches (61 cm); however, vessels may possess up to five percent of the fish on board as undersized fish.

Authorized gear for king mackerel varies by region, including: rod and reel, bandit gear, handline, automatic reel, gillnets, and long gillnets (except north of Cape Lookout, North Carolina); pelagic longline, run-around gillnets (>4.75 inches (12.1 cm) stretched mesh); and purse seine (no more than 400,000 lb may be harvested by purse seine) (SAFMC, 2009).

Amendment 18 to the Fishery Management Plan for the Coastal Migratory Pelagic Resources in the Gulf of Mexico and Atlantic Region implemented many new measures (76 FR 82058; December 29, 2011), but only impacts to the king mackerel fishery are discussed here. The final amendment established ACLs, ACTs, and AMs for king mackerel. In the Gulf of Mexico, this final rule established separate ACLs and AMs for the commercial and recreational sectors based on sector allocations.

As of January 2014 (78 FR 78779; December 27, 2013), headboat vessels fishing in the South Atlantic for snapper-grouper, dolphin and wahoo, and coastal migratory pelagics were required to submit weekly electronic fishing records to the Southeast Fisheries Science Center Science (SEFSC), and the rule prohibited headboats from continuing to fish if they are delinquent in submitting reports. An analogous rule for the reef fish and coastal migratory pelagics in the Gulf of Mexico was implemented in March 5, 2014 (79 FR 6097; February 3, 2014). The Gulf and South Atlantic Councils are currently considering revisions to these requirements.

A framework action in November, 2014, NMFS published a final rule (79 FR 68802; November 19, 2014) modified the commercial trip limits for king mackerel in the Florida east coast subzone (from Flagler/Volusia county line south to Miami-Dade/Monroe county line). The rule established a 50 fish per trip limit from November 1-the end of February each year. From March 1-March 31, if 70 percent or more of the quota is met, the trip limit is 50 fish; if less than 70 percent of the quota is met, then the trip limit is 75 fish until March 31.

More recent changes to king mackerel trip limits and fishing seasons occurred under Amendment 20B to the FMP (effective March 1, 2015; 80 FR 4216, January 27, 2015). The final rule for Amendment 20B revised Gulf king mackerel hook and line trip limits in the Florida West Coast zone Northern and Southern subzones and modified the Northern subzone fishing year; created a transit provision for areas closed to king mackerel; and established Northern and Southern zones with commercial quotas for Atlantic king mackerel. In addition, the final rule implemented created northern and southern zones for Atlantic migratory group king mackerel, each with separate commercial quotas. The boundary between the zones is a line extending from the South Carolina/ North Carolina state line. The commercial ACL is split between the zones based on landings from the 2002/ 2003–2011/2012 fishing years. For king mackerel, applying this formula results in an allocation of 33.3 percent for the northern zone and 66.7 percent for the southern zone. As with Spanish mackerel, NMFS will monitor the commercial quotas, and close Federal waters in each zone when the respective quota is reached or projected to be reached. Transfer of quota between zones is allowed through a request to NMFS initiated by either North Carolina (northern zone) or Florida (southern zone). The recreational ACLs for Atlantic migratory group king mackerel remain unchanged.

Quotas, trip limits, and fishing years depend on the regions and gear types. As of March 1, 2015, in the south Atlantic, the fishing season is March 1 through the end of February. There are Northern and Southern zones where the boundary is a line extending from the South Carolina/ North Carolina state line. The Northern zone quota is 1,292,040 lb; the Southern zone quota is 2,587,960 lb.

The Gulf migratory group of king mackerel is divided into Western and Eastern zones; the Western and Eastern zone are further divided into sub-zones. The Western zone extends from the southern border of Texas to the Alabama/Florida state line. The fishing year is July 1 through June 30 with a trip limit of 3,000 lb ww. The quota is 1,071,360 lb ww. The Gulf Eastern Zone is divided into several subzones and only includes waters off Florida.

Other minor rules include a final rule (79 FR 34246; June 16, 2014) for Amendment 20A that restricted sales of king mackerel caught under the bag limit (those fish harvested by vessels that do not have a valid commercial vessel permit for king or Spanish mackerel and are subject to the bag limits) and removed the income qualification requirements for king mackerel commercial vessel permits. There is no federal private angling fishing permit for this fishery.

NMFS published a final rule (80 FR 78670; December 17, 2015) for framework Amendment 3, which made changes to commercial regulations on king mackerel harvested by gillnets in the Gulf of Mexico. The final rule modified management of the king mackerel gillnet component of the commercial sector of the CMP fishery by 1) increasing the trip limit from 25,000 pounds to 45,000 pounds; 2) adding an accountability measure to reduce the annual catch limit in the year following an overage; 3) modifying electronic reporting requirements to improve timeliness of reporting while reducing redundancy for dealers, and 4) implementing a landings requirement to renew a gillnet permit. The final rule was effective January 19, 2016.

Finally, Draft Amendment 26 to the FMP was released in July 2015 that proposes to address issues associated with the king mackerel stock boundary; updated biological parameters for Gulf and Atlantic migratory groups of king mackerel; ABC levels for Atlantic migratory group king mackerel; ACL for Gulf and Atlantic migratory groups of king mackerel; zone commercial quotas for Gulf migratory group king mackerel; recreational and commercial allocation of Gulf migratory group king mackerel; sale of incidental catch of Atlantic migratory group king mackerel in the small coastal shark drift gillnet fishery; and management measures for commercial harvest of Atlantic migratory group king mackerel on the Florida east coast. The South Atlantic Council approved the amendment in March 2016 and the Gulf Council approved in April 2016. The amendment was sent to NMFS in July 2016.

There are 47 king mackerel permits held by Atlantic Tunas Longline category permit vessels as of December 14, 2015 (Table 5.2). The king mackerel fishery is limited access so entry by those who do not currently possess a permit would be more difficult. As with the Atlantic dolphin/wahoo fishery, the most overlap seems to occur with the HMS pelagic longline fishery and king mackerel. However, there is no overlap with the gillnet sector of the king mackerel fishery and the HMS pelagic longline fleet (Table 5.2). In terms of impacts of Draft Amendment 5b on the king mackerel recreational fishery, if the anglers also obtain a shark endorsement on their HMS permit, they would have to use circle hooks when fishing with natural baits and using

a wire or heavy monofilament leader (*i.e.*, they are targeting sharks recreationally) or using natural baits when fishing for sharks in tournaments that bestow points, prizes, or awards for sharks. Circle hooks could increase post-release survival of many species not retained, potentially resulting in moderate beneficial cumulative ecological impacts. It is anticipated that the change in hook type for recreational anglers could be a minor adverse cumulative socio-economic impact, however, it would be required when fishers are targeting sharks, thus, resulting in minimal adverse socioeconomic cumulative impacts.

South Atlantic Snapper-Grouper Fishery

The South Atlantic Fishery Management Council manages the 60 species that comprise the south Atlantic snapper-grouper fishery management unit consisting of snappers, groupers, porgys, triggerfish, jacks, tilefishes, grunts, spadefishes, wrasses, and sea basses (FMU) (NMFS 1983). In 1998, Amendment 8 to the snapper-grouper FMP was implemented initiating a limited access program. Recent stock assessments were conducted for two deepwater snapper-grouper species, snowy grouper and golden tilefish as well as some shallower snapper-grouper species (red porgy, vermilion snapper, and black sea bass). Snowy grouper, hogfish, red snapper, and red porgy were found to be overfished. However, red porgy and snowy grouper were determined to not be experiencing overfishing (SEDAR, 2013). A 2011 stock assessment on Atlantic golden tilefish indicated that the stock is not overfished and overfishing is not occurring (SEDAR, 2011). A 2012 update for vermillion snapper indicated that the stock is not overfished and not experiencing overfishing (NMFS, 2012). A 2013 update for Atlantic black sea bass indicated that the stock is rebuilt and not experiencing overfishing (NMFS, 2013). In the most recent assessments, hogfish, red snapper, blueline tilefish, speckled hind, and Warsaw grouper were determined to be experiencing overfishing. Currently there is an ongoing joint SAFMC/MAFMC assessment going on for Atlantic blueline tilefish stock(s) in SEDAR 50, which is expected to be completed in August 2017. An assessment of south Atlantic red snapper conducted in 2008 determined that the stock is overfished and experiencing overfishing; SEDAR 41 was completed in March 2016 and indicated that the stock is still overfished and experiencing overfishing (SEDAR 2016a). Stock assessments for South Atlantic red grouper indicated that the stock is overfished and undergoing overfishing (SEDAR, 2010a) and South Atlantic and Gulf of Mexico black grouper were found to not be overfished or experiencing overfishing (SEDAR, 2010b).

New entrants into the snapper-grouper fishery must obtain two existing snapper-grouper transferable permits and exchange them for one new permit. Allowable commercial gear for the snapper-grouper fishery includes vertical hook and line including bandit gear, black seabass pots, sink nets (North Carolina only), and bottom longline. The South Atlantic snapper-grouper bottom longline fishery already has regulations in place regarding gears, such as requirements to use non-stainless steel circle hooks and dehooking devices. Thus, changes due to Draft Amendment 5b, such as circle hooks when using bottom longline gear, and releasing sharks not landed with a dehooker or attending Safe Handling and Release Workshop, which is already required for the fleet, are not anticipated to affect this commercial fishery in terms of socio-economic impacts. Overall, they would add to mortality reductions for all species, and therefore, could have minor beneficial ecological impacts. Pelagic longline is not an authorized gear in this fishery so HMS pelagic longline impacts are not relevant in the snapper-grouper fishery.

Therefore, changes in the recreational and charter/headboat sectors are focused on in the following discussion. In response to the 2006 Magnuson-Stevens Reauthorization Act and the 2008 red snapper stock assessment, the South Atlantic Fishery Management Council developed Amendment 17 to address overfishing requirements by 2010. This includes increasing catch limits and establishing new closed areas for snapper-grouper fishing. The amendment established ACLs and AMs for 10 species (red snapper, golden tilefish, snowy grouper, speckled hind, Warsaw grouper, black grouper, black sea bass, gag, red grouper, and vermilion snapper) within the snapper-grouper fishery. The Amendment was split into two, with Amendment 17A addressing the overfishing of red snapper (75 FR 76874; December 8, 2010), and Amendment 17B addressing ACLs and AMs for black grouper, black sea bass, gag, golden tilefish, red grouper, snowy grouper, vermilion snapper, speckled hind, and Warsaw grouper (75 FR 82280; December 30, 2010).

Amendment 17A established an ACL of zero for red snapper, which means all harvest and possession of red snapper in or from the South Atlantic EEZ is prohibited. This rule also implemented an area closure that extends from southern Georgia to northern Florida and hook restriction. Additionally, Amendment 17A established a rebuilding plan for red snapper and requires a monitoring program as the AM for red snapper. Regulatory Amendment 10 removed the snapper-grouper area closure implemented through Amendment 17A to the FMP (76 FR 23728; April 28, 2011). The intended effect of this final rule is to minimize socioeconomic impacts to snapper-grouper fishermen, without subjecting the red snapper resource to overfishing. Amendment 17B established ACLs and AMs for eight snapper-grouper species in the FMP that are undergoing overfishing, and for black grouper, which was recently assessed and determined to not be undergoing overfishing or overfished (75 FR 82280; December 30, 2010). The intent of this final rule was to address overfishing of eight snapper-grouper species while maintaining catch levels consistent with achieving optimum yield.

Regulatory Amendment 9 reduced the recreational bag limit for black sea bass, increased the commercial trip limit for greater amberjack, and established commercial trip limits for vermilion snapper and gag (76 FR 34892; June 15, 2011). The final rule addressed derby-style fisheries for black sea bass, gag, and vermilion snapper while reducing the rate of harvest to extend the fishing seasons of these three species, to achieve OY for greater amberjack, and to implement technical corrections to the regulations.

The final rule for Amendment 19 to the South Atlantic Snapper Grouper FMP (78 FR 58249; September 23, 2013) specified ABC, and revised the OY, the commercial and recreational ACLs, and the recreational ACT for black sea bass harvested in or from the South Atlantic exclusive economic zone (EEZ).

The Final rule for Amendment 18A South Atlantic Snapper Grouper FMP (77 FR 32408; June 1, 2012) modified the current commercial and recreational black sea bass size limits; and improved data reporting in the for-hire sector of the snapper-grouper fishery.

The Final rule for Amendment 24 South Atlantic Snapper Grouper FMP (77 FR 34254; June 11, 2012) removed the gag, black grouper, and red grouper combined commercial and recreational ACLs and AMs, and specifies the ACLs and AMs for red grouper. This final rule implements in-season commercial and recreational sector AMs for red grouper, as well as post-season overage

adjustments. In addition to the actions contained in this final rule, specific to red grouper, Amendment 24 implemented a 10-year rebuilding plan, specifies the MSY and OY values, revises the definition of minimum stock size threshold (MSST) to be 75 percent of the spawning stock biomass when fishing at the MSY level, specified commercial and recreational allocations, and establishes a recreational sector ACT. Amendment 24 and its final rule specified ACLs and AMs for red grouper while maintaining catch levels consistent with achieving OY for the red grouper resource.

Comprehensive ACL Amendment to the Fishery Management Plans for the Snapper-Grouper Fishery, the Golden Crab Fishery, the Dolphin and Wahoo Fishery, and the Pelagic Sargassum Habitat implemented many new measures (77 FR 15916; March 12, 2012), but only impacts to the snapper-grouper fishery are discussed below. This final rule identified snapper-grouper species that do not need Federal management and can therefore be removed from the Snapper-Grouper FMP; designated selected snapper-grouper species as ecosystem component species; established species groups for selected snapper-grouper species for more effective management; established ACLs and AMs for the commercial and recreational sectors; and establishes a daily vessel limit for the recreational possession of wreckfish and creates a closed season for the wreckfish recreational sector. Amendment 18A modified the current system of accountability measures for black sea bass, limits effort in the black sea bass segment of the snapper-grouper fishery, and improved fisheries data in the for-hire sector of the snapper-grouper fishery (77 FR 32408; June 1, 2012). This rule updated the rebuilding plan and modifies the ABC for black sea bass, which intends to reduce overcapacity in the black sea bass segment of the snapper-grouper fishery.

The final rule for Regulatory Amendment 12 to the South Atlantic Snapper-Group FMP (77 FR 61295; October 9, 2012) revised the OY for golden tilefish in the South Atlantic EEZ and modifies the golden tilefish ACL to be equal to the OY. Regulatory Amendment 12 also revised the recreational AMs. This rule specifies the revised commercial and recreational ACLs for golden tilefish and the revised recreational AMs for golden tilefish.

The final rule for Regulatory Amendment 21 to the South Atlantic Snapper-Group FMP (79 FR 60379; October 7, 2014) modified the definition of the overfished threshold for red snapper, blueline tilefish, gag, black grouper, yellowtail snapper, vermilion snapper, red porgy, and greater amberjack, which impacts both recreational and commercial fisheries.

The file rule for Amendment 29 to the South Atlantic Snapper-Group FMP (80 FR 30947; June 1, 2015) updated the ABC control rule for unassessed stocks (Bar jack, margate, red hind, cubera snapper, yellowedge grouper, silk snapper, Atlantic spadefish, gray snapper, lane snapper, rock hind, tomtate, white grunt, scamp, and gray triggerfish), revised the ABCs for 14 snapper-grouper species through application of the new control rule, and revised the recreational ACTs for three snapper-grouper species complexes and four snapper-grouper species based on the revised ABCs. The final rule revised the ACLs for the commercial and recreational sectors for three snapper grouper species complexes and four snapper-grouper species based on the revised ABCs using the "Only Reliable Catch Stocks" (ORCS) approach, and set the ACL and OY equal to the ABC for the snappers complex, grunts complex, shallow-water complex, bar jack, Atlantic spadefish, and gray triggerfish. For scamp, the ACL and OY equal 90 percent of the ABC, due to concerns about stock status. The recreational ACLs were established as: scamp: 116,369 lb ww;

other snappers complex (gray snapper, lane snapper, cubera snapper): 1,172,832 lb ww; shallow water grouper (red hind, rock hind): 48,648 lb ww; bar jack: 49,021 lb ww; gray triggerfish 404,675 lb ww; grunts complex (white grunt, margate, tomtate): 618,122 lb ww; Atlantic spadefish: 661,926 lb ww. The recreational annual catch limits for the snappers complex, shallow water grouper complex, bar jack, Atlantic spadefish, and gray triggerfish increased. The commercial and recreational annual catch limits for the grunts complex and scamp decreased. The final rule also established a 12-inch (30.5-cm), fork length (FL), minimum size limit for gray triggerfish in Federal waters off North Carolina, South Carolina, and Georgia for both the commercial and recreational sectors and increased the minimum size limit to 14 inches (35.6 cm) fork length off the east coast of Florida for both the commercial and recreational sectors.

The final rule for Regulatory Amendment 20 to the South Atlantic Snapper-Group FMP (80 FR 43033; July 21, 2015) revised the snowy grouper recreational ACL to 4,152 fish in 2015; 4,483 fish in 2016; 4,819 fish in 2017, 4,983 fish in 2018; and 5,315 fish in 2019, and subsequent fishing years. The snowy grouper fishing season was year-round with a recreational bag limit of one snowy grouper per vessel per day until implementation of Regulatory Amendment 20 on August 20, 2015. Regulatory Amendment 20 revised the recreational fishing season to one snowy grouper per vessel per day from May through August, with no retention of snowy grouper during the rest of the year.

The final rule for Regulatory Amendment 22 (80 FR 48277; August 12, 2015) revised the commercial and recreational ACLs and directed commercial quotas for gag for the 2015 through the 2019 fishing years and subsequent fishing years, and revised the commercial and recreational ACLs for wreckfish for the 2015 through the 2020 fishing years and subsequent fishing years. The recreational ACL for gag is 310,023 lb gutted weight for 2015; 312,351 lb gutted weight for 2016; 331,902 lb gutted weight for 2017; 348,194 lb gutted weight for 2018; and 359,832 lb gutted weight for 2019 and subsequent fishing years. The recreational ACL for wreckfish is 21,650 round weight for 2015; 21,185 lb round weight for 2016; 20,710 lb round weight 2017; 20,315 lb round weight for 2018; 19,840 lb round weight for 2019; and 19,455 lb round weight, for 2020 and subsequent fishing years. The recreational ACLs gradually increase for gag whereas they gradually decrease from 2015 to 2020 for wreckfish.

As of January 2014 (78 FR 78779; December 27, 2013), headboat vessels fishing in the South Atlantic for snapper-grouper, dolphin and wahoo, and coastal migratory pelagics were required to submit weekly electronic fishing records to the Southeast Fisheries Science Center Science and Research Director, or at intervals shorter than a week if notified by the Science and Research Director, and prohibits headboats from continuing to fish if they are delinquent in submitting reports. An analogous rule for the reef fish and coastal migratory pelagics in the Gulf of Mexico was implemented in March 5, 2014 (79 FR 6097; February 3, 2014). The Gulf and South Atlantic Councils are currently considering revisions to these requirements.

NMFS published a final rule for the Generic Accountability Measures and Dolphin Allocation Amendment (Generic AM Amendment), which encompasses Amendment 34 to the Fishery Management Plan for the Snapper-Grouper Fishery of the South Atlantic Region, Amendment 9 to the FMP for the Golden Crab Fishery of the South Atlantic Region, and Amendment 8 to the FMP for the Dolphin and Wahoo Fishery of the Atlantic. The final rule revised the commercial and recreational AMs for golden crab and numerous snapper-grouper species (golden tilefish,

snowy grouper, gag, red grouper, black grouper, scamp, the other shallow-water grouper complex (SASWG: red hind, rock hind, yellowmouth grouper, yellowfin grouper, coney, and graysby), greater amberjack, the other jacks complex (lesser amberjack, almaco jack, and banded rudderfish), bar jack, yellowtail snapper, mutton snapper, the other snappers complex (cubera snapper, gray snapper, lane snapper, dog snapper, and mahogany snapper), gray triggerfish, wreckfish (recreational sector), Atlantic spadefish, hogfish, red porgy, and the other porgies complex (jolthead porgy, knobbed porgy, whitebone porgy, scup, and saucereye porgy). This final rule also revised commercial and recreational sector allocations for dolphin in the Atlantic. The actions are intended to make the AMs consistent for snapper-grouper species addressed in the final rule and for golden crab, and revise the allocations between the commercial and recreational sectors for dolphin and were effective on February 22, 2016.

The final rule for Amendment 32 to the South Atlantic Snapper-Grouper FMP (FR 80 16583; March 30, 2015) removed blueline tilefish from the deep-water complex; established blueline tilefish commercial and recreational sector ACLs and AMs; revised the deep-water complex ACLs and AMs; established a blueline tilefish commercial trip limit; and revised the blueline tilefish recreational bag limit. The recreational sector for blueline tilefish in or from the South Atlantic EEZ is closed from January 1 through April 30, and September 1 through December 31, each year. During a closure, the bag and possession limit for blueline tilefish in or from the South Atlantic EEZ is zero. Otherwise, the bag limit is one blueline tilefish per vessel. The rule established a recreational ACL for deep-water grouper complex (yellowedge grouper, silk snapper, misty grouper, queen snapper, sand tilefish, black snapper, and blackfin snapper) of 38,644 lb round weight. The rule established a recreational ACL for blueline tilefish of 17,791 lb for 2015; 26,691 lb for 2016; 35,685 lb for 2017; and 43,925 lb for 2018 and subsequent fishing years.

On December 14, 2015, NMFS announced a control date that may limit or restrict access in commercial and recreational fisheries for the blueline tilefish fishery in Federal waters north of the Virginia/ North Carolina border (80 FR 77312). The control date of December 14, 2015, would be for potential use in determining historical or traditional participation for the commercial and for-hire recreational sectors of the blueline tilefish fishery.

Based on these actions in the South Atlantic, commercial landings in the unregulated mid-Atlantic portion of the blueline tilefish range have increased creating a potential long-term risk to the conservation of the species and the substantial possibility of overfishing the stock. Based upon these concerns about the effects of the unregulated harvest of blueline tilefish, the Mid-Atlantic Fishery Management Council submitted a request on March 10, 2015, for Secretarial emergency action under section 305(c) of the Magnuson-Stevens Fishery Conservation and Management Act to implement temporary management measures for blueline tilefish in the Greater Atlantic Region. On June 4, 2015, NMFS published an emergency rule (80 FR 31864) to establish temporary management measures, including possession limits for the commercial and recreational sectors of the fishery and permitting and reporting requirements for commercial and for-hire vessels that fish for blueline tilefish north of the Virginia/North Carolina border. Then on November 30, 2015 (80 FR 74712), NMFS extended the emergency measures for an additional 186 days through June 3, 2016. After requesting emergency action, the Mid-Atlantic Council began developing a plan for long-term management of this species. At its April 2015 meeting, the Council initiated scoping for either a new deep-water species complex FMP, with

an initial focus on blueline tilefish, or an amendment to the Golden Tilefish FMP to add blueline tilefish to the management unit. After scoping hearings and review of public comments, the Council opted to initiate an amendment to the existing Golden Tilefish FMP. Following development of a range of management measures, the Council held a series of public meetings in March 2016 to solicit feedback on the measures contained in the draft amendment. On April 13, 2016, the Mid-Atlantic Council took final action to select preferred alternatives and approve the amendment for submission to NMFS for review and implementation. Until these measures are approved by the Secretary of Commerce, NMFS issued a temporary rule on June 17, 2016 (81 FR 39591) to implement management measures for blueline tilefish in the Greater Atlantic Region requiring commercial or for-hire vessels landing blueline tilefish in the Greater Atlantic Region (i.e., north of the latitude of the Virginia/ North Carolina border: 36°33′01.0″ N. latitude) to hold a valid Greater Atlantic open access golden tilefish commercial or charter/party vessel permit; implementing a commercial possession limit of 300 lb (136 kg) whole weight per trip; and; implementing a recreational possession limit of seven blueline tilefish per person, per trip. These measures would be effective from July 17, 2016 through December 14, 2016.

In July 2015, NMFS announced a Notice of Intent (80 FR 45642; July 31, 2015) for Amendment 37 to the Snapper-Grouper FMP in the South Atlantic for hogfish. Based on a stock assessment in 2014 for hogfish, hogfish constitutes three separate stocks. There are two stocks in the South Atlantic, one stock off Georgia and North Carolina (GA-NC) and one in the Florida Keys and eastern Florida (FLK/EFL) (this stock is subject to overfishing and is overfished). The third stock is in the Gulf of Mexico off the west coast of Florida. Amendment 37 and the associated EIS would contain alternatives for the two South Atlantic stocks (FLK/EFL and GA-NC) for management reference points (optimum yield and maximum sustainable yield), status determination criteria (overfishing limit and minimum stock size threshold), ACLs (including by sector), ACTs, accountability measures, and new or modified commercial and recreational minimum size limits, commercial trip limits, and recreational bag limits. Public hearings were held for this amendment in early 2016, and management alternatives were discussed at the June 2016 South Atlantic Fishery Management Council meeting. The Council is scheduled to approve the amendment for Secretarial review during its September 2016 meeting.

The SAFMC also approved Regulatory Amendment 25 to the South Atlantic Snapper-Grouper FMP (Regulatory Amendment 25) in December 2015. Regulatory Amendment 25 for blueline tilefish, yellowtail snapper; and black sea bass. On July 13, 2016 (81 FR 45245) NMFS issued regulations to implement Regulatory Amendment 25. The final rule revised the commercial and recreational ACLs, the commercial trip limit (to 300 lb (136 kg) gutted weight; 336 lb (152 kg), round weight), and the recreational bag limit for blueline tilefish (to three fish per person per day for the months of May through August and the bag limit remains part of the aggregate bag limit for grouper and tilefish. There will continue to be no recreational retention of blueline tilefish during the months of January through April and September through December, each year). Additionally, the final rule revised the black sea bass recreational bag limit (to seven fish per person per day) and the commercial and recreational fishing years for yellowtail snapper to be August 1 through July 31, each year. The rule became effective August 12, 2016.

At the June 2015 South Atlantic Fishery Management Council meeting, the Council began development of Amendment 41 to the South Atlantic Snapper-Grouper FMP (Amendment 41) with actions to revise the biological parameters, catch levels, and management measures for

mutton snapper. The Council held scoping meetings were held in Jan/Feb 2016 and public hearings were scheduled for August. The Council intends to review public comments and continue to develop preferred management measures during the September 2016 meeting.

On June 22, 2016 (81 FR 32249; May 22, 2016) NMFS implemented a final rule for Amendment 35 and removed black snapper, mahogany snapper, dog snapper, and schoolmaster from the FMP and the regulations, and revised the golden tilefish longline endorsement regulations to be consistent with the Council's original intent for establishing the longline endorsement program. The final rule clarified the regulation where vessels with valid or renewable golden tilefish longline endorsements anytime during the fishing year were not eligible to fish for golden tilefish using hook-and-line gear under this 500-lb (227-kg), gutted weight, trip limit.

On February 1, 2016 (81 FR 5102), NMFS in collaboration with the South Atlantic Fishery Management Council announced that they are preparing an Environmental Assessment for Amendment 36 to the FMP for the Snapper-Grouper Fishery of the South Atlantic Region (Amendment 36). Amendment 36 considers alternatives to implement special management zones (SMZs) in the exclusive economic zone of the South Atlantic. Through Amendment 36, the Council is considering modifications to the SMZ process and framework procedures to include the consideration of SMZs that would protect locations where snapper-grouper species are likely to spawn and natural habitats that support spawning fish. The Council approved the amendment in March 2016 and plans to send amendment to NMFS in August 2016.

During the June 2016 South Atlantic Fishery Management Council meeting, a control date of June 15, 2016, was also established for three open access charter/headboat and vessel permits, including the Atlantic For-Hire Dolphin Wahoo Permit, The South Atlantic Coastal Migratory Pelagics (Mackerels & Cobia) For-Hire Permit, and the South Atlantic Snapper Grouper For-Hire Permit.

While the recreational fisheries in the South Atlantic vary in degrees of harvest controls, most of the regulations in conjunction with the recreational alternatives for Amendment A5b could have minimal to moderate beneficial cumulative ecological impacts and minimal adverse cumulative socioeconomic impacts. Draft Amendment 5b would create additional outreach for recreational anglers and require the use of circle hooks when fishing with natural baits and using a wire or heavy monofilament leader (*i.e.*, they are targeting sharks recreationally) or using natural baits when fishing for sharks in tournaments that bestow points, prizes, or awards for sharks. Circle hooks could increase post-release survival of many species not retained, potentially resulting in moderate beneficial cumulative ecological impacts. It is anticipated that the change in hook type for recreational anglers could be a minor adverse cumulative socio-economic impact, however, it would be required when fishers are targeting sharks, thus, resulting in minimal adverse socioeconomic cumulative impacts.

As of December 14, 2015, 21 Atlantic Tunas Longline vessels also have permits in the Atlantic snapper-grouper fishery (Table 5.2). However, as pelagic longline is not an authorized gear in this fishery, it is not anticipated that any changes in the HMS pelagic longline fishery with regard to Draft Amendment 5b would impact the commercial snapper-grouper fishery.

5.2 Cumulative Ecological Impacts

Each alternative is described in Chapter 2.0 and a detailed discussion of ecological impacts for each alternative can be found in Chapter 4.0. Preferred Alternative A2 would require HMS permit holders fishing for sharks recreationally to obtain a shark endorsement, which requires completion of an online shark identification and fishing regulation training course and quiz. This would improve compliance with the regulations and reduce dusky shark bycatch mortality. This alternative would likely result in direct short- and long-term moderate beneficial ecological impacts. Indirect short- and long-term minor beneficial ecological impacts would be expected from Alternative A2. When considered in the context of management measures in the past, present, and foreseeable future, the cumulative impacts of Alternative A2 would be moderate and beneficial, the same as the direct ecological impacts discussed above.

Preferred Alternative A6a would require the use of circle hooks by all HMS permit holders fishing for sharks recreationally. Circle hooks would reduce dusky shark bycatch mortality. For this reason, Alterative A6a would likely have direct moderate beneficial impacts in both the short- and long-term for dusky sharks. Alternative A6a would likely have indirect moderate beneficial impacts in both the short- and long-term since other species could similarly be released more easily and in better condition. For these reasons, NMFS prefers this alternative at this time. When considered in the context of management measures in the past, present, and foreseeable future, the cumulative impacts of Alternative A6a would be moderate and beneficial, the same as the direct ecological impacts discussed above.

Overall, the preferred recreational alternatives (Alternatives A2 and A6a) would likely have direct short- and long-term moderate, beneficial ecological impacts. These alternatives would likely have indirect moderate, beneficial impacts in both the short- and long-term. The cumulative impacts of the preferred recreational alternatives would be moderate and beneficial.

Preferred Alternative B3 would require fishermen with an Atlantic shark limited access permit with pelagic longline gear onboard to release all sharks not being retained using a dehooker or cutting the gangion less than three feet from the hook. This would reduce dusky shark bycatch mortality. This alternative is anticipated to have short- and long-term minor, beneficial ecological impacts, because using a dehooker or cutting the gangion no more than three feet from the hook would reduce the amount of trailing gear attached to released dusky sharks, which would contribute in decreasing post-release mortality. Indirect short- and long-term minor, beneficial ecological impacts to incidentally caught species as other incidentally this release requirement would also likely reduce post-release mortality for other species of sharks caught incidentally. Cumulative impacts would be minor and beneficial, especially if fishermen apply this requirement to releasing sharks in other fisheries that they may participate in.

Preferred Alternative B5 would require completion of dusky shark identification and fishing regulation training as part of the Safe Handling and Release Workshop currently required for pelagic longline, bottom longline, and shark gillnet vessel owners and operators. NMFS anticipates that in the short-term, the direct impacts would be neutral as dusky shark discards would still occur until the vessels that interact with a substantial number of dusky sharks are trained to better avoid bycatch and minimize discard mortality. However, in the long-term, the

direct impacts could become moderate and beneficial as fishermen learn how to avoid dusky sharks and how to maximize the potential for survival of any dusky sharks they accidentally caught. The indirect ecological impacts in the short-and long-term are expected to be neutral as the training would be specific to dusky sharks. The cumulative impacts would be moderate and beneficial as fishermen learn how to avoid dusky sharks in other fisheries that they participate in as well as when fishing in the HMS commercial fisheries.

Preferred Alternative B6 would increase dusky shark outreach and awareness through development of additional outreach materials and requiring pelagic longline, bottom longline, and shark gillnet fishermen to abide by a dusky shark fleet communication and relocation protocol. Providing the fleet with more information regarding dusky shark locations and avoiding areas and conditions where dusky sharks have been should reduce dusky shark bycatch. This additional awareness from enhanced outreach methods and the fleet communication and relocation protocol would have direct short- and long-term minor beneficial ecological impacts as it would help reduce bycatch of dusky sharks. Indirect short- and long-term impacts are expected to be neutral, assuming that relocating fishing based on dusky shark interactions would not change the level of bycatch of other species. Cumulative impacts would be minor and beneficial if fishermen apply similar bycatch avoidance techniques to other fisheries that they participate in.

Preferred Alternative B9 would require fishermen with an Atlantic shark directed limited access permit to use circle hooks when fishing with bottom longline gear. This alternative would have short- and long-term, direct minor beneficial ecological impacts since research suggests that circle hooks reduce shark at-vessel and post-release mortality rates without reducing catchability compared to J-hooks. Based on research using pelagic longline gear, circle hooks were determined not to affect catch rates of sharks, but do reduce mortality. The short- and long-term indirect impacts to other species are likely to be moderate beneficial, as circle hooks are known to decrease post release mortality over J hooks for a variety of HMS and non-HMS, including protected resources such as sea turtles and marine mammals. Cumulative impacts would be moderate and beneficial due to the benefits of post release mortality on all species.

Overall, the preferred commercial alternatives (Alternatives B3, B5, B6, and B9) would likely have direct short- and long-term minor, beneficial ecological impacts. These alternatives would likely have indirect minor, beneficial impacts in both the short- and long-term. The cumulative impacts of the preferred commercial alternatives would be minor and beneficial.

Overall, the preferred actions in Amendment 5b would have moderate to minor beneficial cumulative ecological impacts. The beneficial ecological impacts associated with the preferred alternative make these actions preferable, particularly given their associated short- and long-term economic impacts, which range from neutral to minor adverse. The preferred alternatives would likely have neutral impacts on the overall fishing effort or fishing rates, bycatch, or bycatch rates in the long-term. Additionally, the preferred actions would maintain the status quo for species currently under a rebuilding plan. This action provides additional ecological benefits since it aims to end overfishing and rebuild the dusky shark stock per the SEDAR 21 stock assessment (SEDAR 2016b). Such measures would help conserve fishery resources in the long-term, which would ultimately have positive ecological impacts. Stopping overfishing and

rebuilding the dusky shark stock can contribute to healthy shark populations and sustainable fisheries.

5.3 Cumulative Social and Economic Impacts

Each alternative is described in Chapter 2.0 and a detailed discussion of socioeconomic impacts for each alternative can be found in Chapter 4.0. Under preferred Alternative A2, HMS permit holders that want to fish recreationally for sharks would be required to obtain a "shark endorsement" from NMFS as a permit condition. This alternative would likely result in direct short- and long-term neutral socioeconomic impacts since there would be no additional cost to the applicant and only a small additional investment in time. Obtaining the shark endorsement would be a part of the normal HMS Angling or Charter/Headboat permit application or renewal. The applicant would simply need to indicate the desire to obtain the shark endorsement after which he or she would be directed to an online quiz that would take minimal time to complete. The cost of developing the online quiz and administering the new shark endorsement may result in a slight increase in annual permit renewal fees, since the fee is set to recover the cost of administering the permit program, including maintenance of the public website and the toll-free phone system. Some recreational anglers might even find the quiz informative and/or entertaining, thus offsetting some of the potential opportunity costs associated with the time required to complete the quiz. The goal of the quiz is to help prevent anglers from landing prohibited or undersized sharks and thus help rebuild stocks. Furthermore, the list of shark endorsement holders would allow for more targeted surveys, likely increasing the reliability of recreational shark catch estimates.

Indirect socioeconomic impacts from this alternative would likely be neutral in the short- and long-term. Indirect socioeconomic impacts include impacts on supporting businesses such as bait and tackle suppliers, marinas, and the hospitality industry in coastal towns. Since obtaining the shark endorsement would not have any additional cost and only a modest increase in time, it is unlikely that any recreational angler would change their decision to target sharks based on the requirements, thus, supporting businesses are unlikely to be impacted. Thus, cumulative impacts are also expected to be neutral for this alternative.

Under preferred Alternative A6a, circle hooks would be required for HMS permit holders with a shark endorsement. Relative to the total cost of gear and tackle for a typical fishing trip, the cost associated with switching from J hooks to circle hooks is negligible. Thus, the immediate cost in switching hook type is likely minimal, resulting in direct minor adverse socioeconomic impacts in the short- and long-term. However, there is some indication that the use of circle hooks may reduce catch per unit effort (CPUE) resulting in lower catch of target species (See Chapter 4.0 for more detail). To the extent that CPUE is reduced, some recreational fishermen may choose not to fish for sharks or to enter tournaments that offer awards for sharks. These missed fishing opportunities could result in indirect minor adverse socioeconomic impacts in the short- and long-term, and cumulative minor adverse socioeconomic impacts. However, since the socioeconomic impacts are minor and circle hooks would reduce fishing mortality for dusky sharks, NMFS prefers Alternative A6a at this time.

Overall, the preferred commercial alternatives (Alternatives A2 and A6a) would likely have neutral to minor direct short- and long-term adverse socioeconomic impacts. These alternatives

would also likely have neutral to minor indirect short- and long-term adverse socioeconomic impacts. The cumulative impacts of the preferred commercial alternatives would be neutral minor and adverse.

Under preferred Alternative B3, fishermen with an Atlantic shark commercial permit fishing with pelagic longline gear would be required to release all sharks that are not being boarded or retained by using a dehooker, or by cutting the gangion no more than three feet from the hook. This alternative would have neutral to minor adverse socioeconomic impacts on commercial shark fishermen using pelagic longline gear. Currently, fishermen are required to use a dehooking device if a protected species (e.g., sea turtle or marine mammal) is caught. This alternative would require this procedure to be used on all sharks that would not be retained, or fishermen would have to cut the gangion to release the shark. Currently, it is common practice in the pelagic longline fishery to release sharks that are not going to be retained (especially larger sharks) by cutting the gangion, but they currently usually do not cut the gangions so only three feet remains so there might be a slight learning curve associated with cutting the gangions no more than three feet from the hook. Therefore, the direct socioeconomic impacts associated with cutting the gangion to release sharks in this alternative would be minor in the short-term as the fishermen adjust to this new practice. Using a dehooker to release sharks in the pelagic longline fishery is a less common practice, therefore, there may be more of a learning curve that would make using this technique more time consuming and making fishing operations less efficient. Although this may be an initial issue, NMFS expects that these inefficiencies would be minimal and that fishermen would become adept in using a dehooker to release sharks over time given they are all adept at using a dehooker to release protected species. Thus, Alternative B3 would be expected to have long-term neutral direct socioeconomic impacts on the pelagic longline fishery. Indirect impacts to businesses like bait and ice houses and seafood dealers are expected to be neutral in the short and long-term as their businesses would not change. Cumulative impacts are also anticipated to be neutral given fishing effort would remain the same.

Alternative B5, a preferred alternative, would provide additional training to pelagic longline, bottom longline, and shark gillnet fishermen. The training would provide information regarding shark identification and regulations, as well as best practices to avoid interacting with dusky sharks and how to minimize mortality of dusky sharks caught as bycatch. This training targeted outreach on dusky shark identification and regulations, which should decrease interactions with dusky sharks. This alternative would have minor adverse direct socioeconomic impacts in the short and long-term since the fishermen would be required to attend a workshop as they currently do every three years, incur some travel costs, and would not be fishing while taking attending the workshop. Indirect impacts to businesses like bait and ice houses and seafood dealers are expected to be neutral in the short and long-term as their businesses would not change. Cumulative impacts are also anticipated to be neutral given fishing effort would remain the same.

The direct socioeconomic impacts associated with preferred Alternative B6, which would establish a communication and fishing set relocation protocol for pelagic longline, bottom longline, and shark gillnet fishermen following interactions with dusky sharks and increase outreach to the pelagic longline fleet, are anticipated to be neutral in the short- and long-term. These requirements would not cause a substantial change to current fishing operations, but have

the potential to help fishermen become more adept in avoiding dusky sharks. If fishermen become better at avoiding dusky sharks, there is the possibility that target catch could increase. On the other hand, the requirement to move the subsequent fishing set one nautical mile from where a previous dusky shark interaction occurred could move fishermen away from areas where they would prefer to fish and it could increase fuel usage and fuel costs. Indirect impacts to businesses like bait and ice houses and seafood dealers are expected to be neutral in the short and long-term as their businesses would not change. Cumulative impacts are also anticipated to be neutral given fishing effort would remain the same.

Alternative B9, a preferred alternative, would require HMS shark directed limited access permit holders to use circle hooks in the bottom longline fishery. Alternative B9 would result in neutral direct short- and long-term social and economic impacts as majority of the HMS shark directed limited access permit holders already possess or use circle hooks while fishing for HMS species. For those permit holders who do not use circle hooks, the cost of circle hooks is comparable to J hooks. In addition, using circle hooks over J hooks could allow fishermen to retrieve the hooks easier since circle hooks usually catch the sharks in the side of their mouths while J hooks are usually swallowed or lines are bitten off by the sharks. Indirect impacts to businesses like bait and ice houses and seafood dealers are expected to be neutral in the short and long-term as their businesses would not change. Cumulative impacts are also anticipated to be neutral given fishing effort would remain the same.

Overall, the preferred commercial alternatives (Alternatives B3, B5, B6, and B9) would likely have neutral direct short- and long-term socioeconomic impacts. These alternatives would likely have neutral indirect socioeconomic impacts in both the short- and long-term. Thus, the cumulative socioeconomic impacts of the preferred commercial alternatives would likely be neutral.

Overall, the preferred actions in Amendment 5b are expected to have minor adverse or neutral cumulative socioeconomic impacts on participants in the recreational and commercial fisheries, based on the detailed discussions of the socioeconomic impacts of each of the preferred actions in Chapter 4.0. NMFS anticipates that the cumulative direct and indirect socioeconomic impacts of all alternatives considered in this rulemaking are likely neutral or minor adverse cumulative socioeconomic impacts.

5.4 Cumulative Impacts

Cumulative impacts are the impacts on the environment, which result from the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time (40 CFR § 1508.7). A cumulative impact includes the total effect on a natural resource, ecosystem, or human community due to past, present, and reasonably foreseeable future activities or actions of federal, non–federal, public, and private entities. Cumulative impacts may also include the effects of natural processes and events, depending on the specific resource in question. Cumulative impacts include the total of all impacts to a particular resource that have occurred, are occurring, and would likely occur as a result of any action or influence, including the direct and reasonably foreseeable indirect impacts of a federal activity. The goal of this section is to describe the cumulative ecological, economic

and social impacts of past, present and reasonably foreseeable future actions with regard to the management measures presented in this document (Table 5.3).

Table 5.3 Comparison of the impacts of analyzed alternatives.

Symbol Key:

O Neutral Impacts

O – Minor Adverse Impacts

O + Minor Beneficial Impacts

Ø – Moderate Adverse Impacts

Ø + Moderate Beneficial Impacts

● – Major Adverse Impacts

● + Major Beneficial Impacts

Alternative	Quality	Timeframe	Ecological	Protected Resources	Socio-economic
Alternatives for Recreational Fishing					
A1 No Action. Do not implement management measures to end overfishing of dusky sharks in the Atlantic recreational shark fishery	Direct	Short-term	O –	O	O
		Long-term	O –	O	O to Ø –
	Indirect	Short-term	O	O	O
		Long-term	O	O	O
	Cumulative		O –	O	O to Ø –
***A2** Require HMS permit holders fishing for sharks recreationally to obtain a shark endorsement, which requires completion of an online shark identification and fishing regulation training course – Preferred Alternative*	Direct	Short-term	Ø +	O	O
		Long-term	Ø +	O	O
	Indirect	Short-term	O +	O	O
		Long-term	O +	O	O
	Cumulative		Ø +	O	O
A3 Require HMS permit holders fishing for sharks recreationally to have a NMFS-approved shark identification placard onboard when fishing for and/or retaining sharks	Direct	Short-term	O +	O	O – to ● –
		Long-term	O +	O	O – to ● –

	Indirect	Short-term	0 +	0	0
		Long-term	0 +	0	0
	Cumulative		0 +	0	0
A4 Prohibit retention of all ridgeback sharks in the Atlantic recreational shark fishery. Oceanic whitetip, tiger, and smoothhound sharks would be prohibited from retention	Direct	Short-term	0 +	0	0 –
		Long-term	0 +	0	0 –
	Indirect	Short-term	0 +	0	0 –
		Long-term	0 +	0	0 –
	Cumulative		0 +	0	0 –
A5 Increase the recreational minimum size to 89 inches fork length for all sharks	Direct	Short-term	0 +	0	0 –
		Long-term	0 +	0	0 –
	Indirect	Short-term	0 +	0	0 –
		Long-term	0 +	0	0 –
	Cumulative		0 +	0	0 –
A6a *Require the use of circle hooks by all HMS permit holders fishing for shark recreationally (bait and leader definition) - Preferred Alternative*	Direct	Short-term	0 +	0	0 –
		Long-term	0 +	0	0 –
	Indirect	Short-term	0 +	0	0 –
		Long-term	0 +	0	0 –
	Cumulative		0 +	0	0 –
A6b Require the use of circle hooks by all HMS permit holders with a shark endorsement when fishing for shark recreationally (bait and hook size definition)	Direct	Short-term	0 +	0	0 –
		Long-term	0 +	0	0 –
	Indirect	Short-term	0 +	0	0 –
		Long-term	0 +	0	0 –
	Cumulative		0 +	0	0 –
A6c Require the use of circle hooks by all Atlantic HMS permit holders	Direct	Short-term	0 +	0	0 –

participating in fishing tournaments when targeting or retaining Atlantic sharks.		Long-term	0 +	0	0 –
	Indirect	Short-term	0 +	0	0 –
		Long-term	0 +	0	0 –
	Cumulative		0 +	0	0 –
A7 Allow only catch and release of all Atlantic sharks by HMS permit holders. Anglers could fish for and target sharks but retention of recreationally-caught sharks would be prohibited.	Direct	Short-term	0 +	0	0 –
		Long-term	0 +	0	0 –
	Indirect	Short-term	0 +	0	0 –
		Long-term	0 +	0	0 –
	Cumulative		0 +	0	0 –

Alternative	Quality	Timeframe	Ecological	Protected Resources	Socio-economic
Alternatives for Commercial Fishing					
B1 No Action. Do not implement management measures to end overfishing of dusky sharks in the commercial Atlantic Pelagic Longline Fishery	Direct	Short-term	O –	O	O
		Long-term	O –	O	O to Ø –
	Indirect	Short-term	O	O	O
		Long-term	O	O	O
	Cumulative		O	O	O
B2 Fishermen with an Atlantic shark limited access permit and pelagic longline gear onboard would be limited to 750 hooks per pelagic longline set and no more than 800 assembled gangions onboard at any time.	Direct	Short-term	O +	O +	O –
		Long-term	O +	O +	O –
	Indirect	Short-term	O +	O +	O –
		Long-term	O +	O +	O –
	Cumulative		O	O +	O –
***B3** Fishermen with an Atlantic shark limited access permit with pelagic longline gear onboard must release all sharks not being retained using a dehooker or cutting the gangion less than three feet from the hook. – Preferred Alternative*	Direct	Short-term	O +	O	O –
		Long-term	O +	O	O
	Indirect	Short-term	O +	O	O
		Long-term	O +	O	O
	Cumulative		O +	O	O
B4a Prohibit the use of pelagic longline gear in HMS fisheries in a portion of the Charleston Bump during the month of May ("Charleston Bump Hotspot May")	Direct	Short-term	O +	O +	Ø –
		Long-term	O +	O +	Ø –
	Indirect	Short-term	O to O +	O +	O –
		Long-term	O to O +	O +	O –
	Cumulative		O to O +	O +	Ø –
B4b Prohibit the use of pelagic longline gear in HMS fisheries in the vicinity of the Cape Hatteras Special Research/Hatteras Shelf Area during the month of May ("Hatteras Shelf	Direct	Short-term	O +	O +	Ø –
		Long-term	O +	O +	Ø –

Hotspot May")	Indirect	Short-term	O to O +	O +	O –
		Long-term	O to O +	O +	O –
	Cumulative		O to O +	O +	Ø –
B4c Prohibit the use of pelagic longline gear in HMS fisheries in the vicinity of the Cape Hatteras Special Research/Hatteras Shelf Area during the month of June ("Hatteras Shelf Hotspot June")	Direct	Short-term	O +	O +	Ø –
		Long-term	O +	O +	Ø –
	Indirect	Short-term	O – to O +	O +	O –
		Long-term	O – to O +	O +	O –
	Cumulative		O to O +	O	Ø –
B4d Prohibit the use of pelagic longline gear in HMS fisheries in the vicinity of the Cape Hatteras Special Research/Hatteras Shelf Area during the month of November ("Hatteras Shelf Hotspot November")	Direct	Short-term	O +	O	Ø –
		Long-term	O +	O	Ø –
	Indirect	Short-term	O to O +	O	O –
		Long-term	O to O +	O	O –
	Cumulative		O	O	Ø –
B4e Prohibit the use of pelagic longline gear in HMS fisheries in three distinct closures in the vicinity of the Mid Atlantic Bight Canyons ("Canyons Hotspot") during the month of October	Direct	Short-term	O +	O +	Ø –
		Long-term	O +	O +	Ø –
	Indirect	Short-term	O – to O +	O +	O –
		Long-term	O – to O +	O +	O –
	Cumulative		O	O +	Ø –
B4f Prohibit the use of pelagic longline gear in HMS fisheries in an area in the vicinity of the existing Northeastern closed area during the month of July ("Southern Georges Banks Hotspot July")	Direct	Short-term	O +	O +	Ø –
		Long-term	O +	O +	Ø –
	Indirect	Short-term	O – to O +	O +	O –
		Long-term	O – to O +	O +	O –
	Cumulative		O	O +	Ø –

B4g Prohibit the use of pelagic longline gear in HMS fisheries in an area in the vicinity of the existing Northeastern closed area during the month of August ("Southern Georges Banks Hotspot August")	Direct	Short-term	O +	O +	Ø –
		Long-term	O +	O +	Ø –
	Indirect	Short-term	O – to O +	O +	O –
		Long-term	O – to O +	O +	O –
	Cumulative		O	O +	Ø –
B4h Prohibit the use of pelagic longline gear in HMS fisheries in a portion of the Charleston Bump during the month of November ("Charleston Bump Hotspot November")	Direct	Short-term	O +	O +	Ø –
		Long-term	O +	O +	Ø –
	Indirect	Short-term	O – to O +	O +	O –
		Long-term	O – to O +	O +	O –
	Cumulative		O	O +	Ø –
B4i Allow conditional access to dusky shark hotspot closure areas for HMS vessels fishing with pelagic longline gear	Direct	Short-term	Ø +	O	O –
		Long-term	Ø +	O	O
	Indirect	Short-term	O +	O	O
		Long-term	O +	O	O
	Cumulative		O +	O	O
B4j Implement dusky shark bycatch caps in the pelagic longline gear	Direct	Short-term	Ø +	O +	Ø –
		Long-term	Ø +	O +	Ø –
	Indirect	Short-term	O +	O +	O –
		Long-term	O +	O +	O –
	Cumulative		O +	O +	O –
B5 *Require completion of a shark identification and fishing regulation training as a new part of the safe handling and release workshop for HMS pelagic longline, bottom longline, and shark gillnet vessel owners and operators – Preferred*	Direct	Short-term	O	O	O –
		Long-term	Ø +	O	O –
	Indirect	Short-term	O	O	O

Alternative.		Long-term	O	O	O
	Cumulative		Ø +	O	O
***B6** Increase dusky shark outreach and awareness through development of additional commercial fishery outreach materials, and require pelagic longline, bottom longline, and gillnet vessels to abide by a dusky shark fleet communication and relocation protocol. – Preferred Alternative*	Direct	Short-term	ʘ +	O	O
		Long-term	ʘ +	O	O
	Indirect	Short-term	O	O	O
		Long-term	O	O	O
	Cumulative		ʘ +	O	O
B7 Request that certain states (NJ, DE, MD, VA) and the ASMFC extend end of existing shark closure from July 15 to July 31	Direct	Short-term	ʘ +	O	ʘ –
		Long-term	ʘ +	O	O
	Indirect	Short-term	ʘ +	O	ʘ –
		Long-term	ʘ +	O	O
	Cumulative		O	O	O
B8 Close Atlantic HMS pelagic longline fishery	Direct	Short-term	ʘ +	● +	● –
		Long-term	Ø +	● +	● –
	Indirect	Short-term	● +	● +	● –
		Long-term	● +	● +	● –
	Cumulative		● + to Ø –	● + to Ø +	● –
B9 *Require the use of circle hooks by all shark directed limited access permit holders in the bottom longline fishery – Preferred Alternative*	Direct	Short-term	ʘ +	Ø +	O
		Long-term	ʘ +	Ø +	O
	Indirect	Short-term	Ø +	Ø +	O

		Long-term	Ø+	Ø+	O
	Cumulative		Ø+	Ø+	O
B10 Implement Individual Dusky Shark Bycatch Quotas (IDQs) for the commercial pelagic and bottom longline fisheries	Direct	Short-term	O	O+	Ø-
		Long-term	O	O+	Ø-
	Indirect	Short-term	O	O+	Ø-
		Long-term	O	O+	Ø-
	Cumulative		O-	O+	Ø-

5.5 Mitigation and Unavoidable Impacts

Mitigation is an important mechanism that Federal agencies can use to minimize, prevent, or eliminate damage to the human and natural environment associated with their actions.
As described in the Center for Environmental Quality regulations, agencies can use mitigation to reduce environmental impact in several ways. Mitigation may include one or more of the following: avoiding the impact by not taking a certain action or parts of an action; minimizing impacts by limiting the degree or magnitude of the action and its implementation; rectifying the impact by repairing, rehabilitating, or restoring the affected environment; reducing or eliminating the impact over time by preservation and maintenance operations during the life of the action; and compensating for the impact by replacing or providing substitute resources or environments. The mitigation measures discussed in an EIS must cover the range of impacts of the proposal and must be considered even for impacts that by themselves would not be considered "significant." If a proposed action is considered as a whole to have significant effects, all of its specific effects on the environment must be considered, and mitigation measures must be developed where it is feasible to do so. NMFS may consider mitigation provided that the mitigation efforts do not circumvent the goals and objectives of the rulemaking or the mandate to rebuild fisheries under the Magnuson-Stevens Act.

5.6 Mitigation Measures

5.6.1 Recreational Measures

When taken as a whole, Preferred Alternatives A2 and A6a would have beneficial ecological impacts because the measures would reduce dusky shark fishing mortality in the recreational shark fishery. Thus, no mitigation measures are necessary to address adverse ecological impacts. The preferred alternatives could, however, result in some very minor adverse socioeconomic impacts from the small investment of time to apply for the shark endorsement and take the short shark identification quiz and possible reduction in catch when using circle hooks. The formulation of the preferred alternatives included mitigating measures to limit the adverse socioeconomic impacts. Applying for the shark endorsement would be included in the online

HMS permit application process and would not result in an additional fee. The shark identification quiz would be available online as part of the application process, minimizing the amount of time necessary to complete it. Circle hooks, as would be required in when fishing recreationally for sharks under Alternative A6, could result in a reduction in target catch. However, the requirement is limited to fishermen that hold a shark endorsement. The circle hook requirement would not apply broadly to all HMS anglers, mitigating adverse impacts.

5.6.2 Commercial Measures

When taken as a whole, Preferred Alternatives B3, B5, B6, and B9 would have beneficial ecological impacts because the measures would reduce dusky shark fishing mortality in the commercial fisheries. Thus, no mitigation measures are necessary to address adverse ecological impacts. Preferred Alternatives B3, B5, and B6 would have neutral socioeconomic impacts because these alternatives would not dramatically change commercial fishing practices or training requirements. Currently, fishermen are required to use a dehooking device if a protected species is caught and Alternative B3 would apply this procedure, or releasing the shark by cutting the gangion less than three feet from the shark, to be used on all sharks that would not be retained. Both options are fairly common ways to release protected or unwanted species in the pelagic longline fishery, and would have neutral socioeconomic impacts. Alternative B6, which would establish a communication and fishing set relocation protocol for pelagic longline, bottom longline, and shark gillnet fishermen following interactions with dusky sharks and increase outreach to the fleet, would not cause a substantial change to current fishing operations. Thus, no mitigation measures are necessary to address adverse socioeconomic impacts.

5.7 Unavoidable Adverse Impacts

In general, there are no unavoidable adverse ecological impacts expected as a result of the preferred alternatives and corresponding management measures in the recreational and commercial fisheries to reduce fishing mortality of dusky sharks. NMFS would continue to monitor the impact of the management measures in the preferred alternatives and would propose additional management measures, as necessary, to avoid any unanticipated adverse impacts. However, there are unavoidable adverse socioeconomic impacts as a result of the preferred alternatives and corresponding measures to reduce dusky shark mortality in the recreational and commercial fisheries. In the recreational shark fishery, the use of circle hooks may or may not reduce CPUE resulting in lower catch of some target species (See Chapter 4.0 for more information). To the extent that CPUE is reduced, some recreational fishermen may choose not to fish for sharks or to enter tournaments that offer awards for sharks. These missed fishing opportunities could result in minor adverse socioeconomic impacts in the short- and long-term. This reduction in efficiency, however, is necessary to reduce dusky shark mortality in the recreational fishery.

In the commercial fishery, Alternative B5, a preferred alternative, would provide additional training to pelagic longline, bottom longline, and shark gillnet fishermen. The training course would provide information regarding shark identification and regulations, as well as best practices to avoid interacting with dusky sharks and how to minimize mortality of dusky sharks caught as bycatch. This alternative could have minor adverse socioeconomic impacts since the fishermen would be required to attend a workshop, incur some travel costs, and would not be

fishing while taking attending the workshop, but this new training would be included as part of currently required workshops, resulting in neutral impacts.

5.8 Irreversible and Irretrievable Commitment of Resources

The management measures in the preferred alternatives would not result in any irreversible and irretrievable commitment of resources. There are expected to be positive ecological impacts because of the reduction in dusky shark fishing mortality.

5.9 References

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6.0 Regulatory Impact Review

The Regulatory Impact Review (RIR) is conducted to comply with Executive Order 12866 (E.O. 12866) and provides analyses of the economic benefits and costs of each alternative to the nation and the fishery as a whole. Certain elements required in an RIR are also required as part of this draft environmental impact statement (DEIS). This RIR builds upon the data and analysis presented in Chapters 4.0 and 5.0 of this EIS. The information contained in Chapter 7.0, taken together with the data and analysis incorporated by reference, comprise the complete RIR.

The requirements for all regulatory actions specified in EO 12866 are summarized in the following statement from the order:

> *In deciding whether and how to regulate, agencies should assess all costs and benefits of available regulatory alternatives, including the alternative of not regulating. Costs and benefits should be understood to include both quantifiable measures (to the fullest extent that these can be usefully estimated) and qualitative measures of costs and benefits that are difficult to quantify, but nonetheless essential to consider. Further, in choosing among alternative regulatory approaches, agencies should select those approaches that maximize net benefits (including potential economic, environmental, public health and safety, and other advantages; distributive impacts; and equity), unless a statute requires another regulatory approach.*

E.O. 12866 further requires Office of Management and Budget review of proposed regulations that are considered to be "significant." A significant regulatory action is one that is likely to:

- Have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, local or tribal governments of communities;
- Create serious inconsistency or otherwise interfere with an action taken or planned by another agency;
- Materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the rights and obligations of recipients thereof; or
- Raise novel legal or policy issues arising out of legal mandates, the president's priorities, or the principles set forth in this Executive Order.

6.1 Description of the Management Objectives

Please see Chapter 1.0 for a full description of the objectives of Amendment 5b to the 2006 Consolidated HMS FMP and implementing regulations, including proposed fishery management actions. NMFS identified the following objectives with regard to the fishery management actions:

- End overfishing on dusky sharks;

- Make any necessary modifications to the rebuilding plan for dusky sharks to ensure that fishing mortality levels on dusky sharks are maintained at or below levels that would result in rebuilding in the timeframe recommended by the assessment update;
- Clarify ACLs and implement preventative AMs for the prohibited shark species complex.

6.2 Description of the Fishery

Please see Chapter 3.0 for a description of the fisheries that could be affected by these management actions.

6.3 Statement of the Problem

Please see Chapter 1.0 for a full discussion of the purpose and need for these management actions.

The purpose of Amendment 5b is to develop and implement management measures that would end overfishing of dusky sharks and rebuild the dusky shark stock in conformance with applicable requirements under the Magnuson-Stevens Act to rebuild overfished stocks and end overfishing. The purpose of the proposed measures is to manage fishery resources in a manner that maximizes resource sustainability, while minimizing, to the greatest extent possible, the socioeconomic impacts on affected fisheries. To achieve this purpose, NMFS needs to implement management measures to rebuild the dusky shark stock and end overfishing on the dusky shark stock.

6.4 Description of Each Alternative

Please see Chapter 2.0 for a summary of each alternative and Chapter 4.0 for a complete description of each alternative and its expected ecological, social, and economic impacts. Chapter 7.0 provides additional information related to the economic impacts of the alternatives.

6.5 Economic Analysis of the Expected Effects of Each Alternative Relative to the Baseline

Table 6.1 Net Economic Benefits and Costs of Each Alternative.

Alternative	Net Economic Benefits	Net Economic Cost
Recreational Alternatives		
A1 – No Action. Do not implement management measures to end overfishing and rebuild dusky sharks in the Atlantic recreational shark fishery	No change in economic benefits.	If more restrictive measures are required in the long-term under MSA or other statutes such as the Endangered Species Act, moderate adverse socioeconomic impacts may occur.
A2 - Require HMS Angling and Charter/Headboat permit holders to obtain a shark endorsement, which requires completion of an online shark identification and fishing regulation training course, in order to retain sharks (Preferred)	There could be some unquantified socioeconomic benefits in the long-term associated with potential reductions in landings of dusky and other prohibited shark species by recreational anglers as a result of improved species identification and improved compliance with the regulations.	Development of the shark endorsement and training course could add some minor administrative costs to the HMS permit program. There could be some minor time costs for recreational fishermen that complete the online shark identification and fishing regulation training course.
A3 – Require HMS Angling and Charter/Headboat permit holders to have a NMFS-approved shark identification placard onboard when fishing for and/or retaining sharks.	There could be some minor unquantified socioeconomic benefits in the long-term associated with potential reductions in dusky overfishing by recreational anglers as a result of improved species identification.	There could be some minor economic costs associated with fishermen printing or obtaining a placard to store on their vessel when fishing for sharks.
A4 – Prohibit retention of all ridgeback sharks in the Atlantic recreational shark fishery. Oceanic whitetip, tiger, and smoothhound sharks would be prohibited from retention by HMS Angling and Charter/Headboat permit holders.	This alternative would simplify compliance for the majority of fishermen targeting sharks. There could be some unquantified socioeconomic benefits in the long-term associated with potential reductions in dusky overfishing by recreational anglers as a result of the reduced retention of all ridgeback sharks. Recreational anglers practicing catch-and-release fishing for sharks may experience more interactions with sharks if shark stocks increase as a result of the prohibition on retention.	This alternative could potentially have adverse socioeconomic costs for a small subset of fishermen that target oceanic whitetip, tiger, and smoothhound sharks. Those fishermen would no longer be able to retain those sharks and might therefore receive decreased benefit from their fishing trips and they might reduce their demand for fishing charter or headboat trips. Recreational fishermen with only state-issued permits, however, would still be able to retain these species unless a state(s) matches federal regulations.
A5 - Increase the recreational minimum size to 89 inches fork length for all sharks.	Because many shark species have a maximum size below an 89 inch size limit, most recreational shark fishing would be limited to catch-and-	Because many shark species have a maximum size below an 89 inch size limit, there would be reduced incentive to fish recreationally for sharks due to the

Alternative	Net Economic Benefits	Net Economic Cost
	release only fishing. Recreational anglers practicing catch-and-release fishing for sharks may experience more interactions with sharks if shark stocks increase as a result of a prohibition on retention. There could be some minor unquantified socioeconomic benefits in the long-term associated with potential reductions in dusky overfishing by recreational anglers as a result of fewer mistaken landings of smaller dusky sharks.	decreased potential to legally land these fish. Implementation of this management measure could significantly alter the way some tournaments and charter vessels operate, or reduce both opportunities to fish for sharks and the drastically reduce general interest and demand for recreational shark fishing, which could create adverse socioeconomic impacts.
A6a – Require all Atlantic HMS permit holders participating in fishing tournaments that bestow points, prizes, or awards for sharks to deploy circle hooks when fishing natural baits. Require the use of circle hooks by all HMS Angling and Charter/Headboat permit holders with a shark endorsement when deploying natural bait while using a wire or heavy (200 pound test or greater) monofilament or fluorocarbon leader outside of a fishing tournament (Preferred)	There could be some minor unquantified socioeconomic benefits in the long-term associated with potential reductions in dusky mortality resulting from recreational angling because of potential reduced mortality of dusky sharks caught using circle hooks in tournaments and in recreational fishing for sharks outside of tournaments.	There is a negligible cost associated with switching from J-hooks to circle hooks. However, there is conflicting indication that the use of circle hooks may either reduce or increase catch per unit effort (CPUE) resulting in lower or higher catch of target species. In the event that CPUE is reduced, some recreational fishermen may choose not to fish for sharks.
A6b – Require all Atlantic HMS permit holders participating in fishing tournaments that bestow points, prizes, or awards for sharks to deploy circle hooks when fishing natural baits. Require the use of circle hooks by all HMS Angling and Charter/Headboat permit holders with a shark endorsement when deploying a 5/0 or greater size hook to fish with natural bait outside of a fishing tournament.	There could be some minor unquantified socioeconomic benefits in the long-term associated with potential reductions in dusky mortality resulting from recreational because of potential reduced mortality of dusky sharks caught using circle hooks in tournaments and in recreational fishing for sharks outside of tournaments.	There is a negligible cost associated with switching from J-hooks to circle hooks. However, there is conflicting indication that the use of circle hooks may either reduce or increase catch per unit effort (CPUE) resulting in lower or higher catch of target species. In the event that CPUE is reduced, some recreational fishermen may choose not to fish for sharks.
Alternative 6c – Require the use of circle hooks by Atlantic HMS permit holders participating in fishing tournaments that bestow points, prizes, or awards for sharks.	There could be some minor unquantified socioeconomic benefits in the long-term associated with potential reductions in dusky mortality resulting from recreational angling in tournaments because of potential reduced mortality of dusky sharks caught using circle hooks in tournaments and in recreational fishing for sharks outside of tournaments.	There is a negligible cost associated with switching from J-hooks to circle hooks. However, there is conflicting indication that the use of circle hooks may either reduce or increase catch per unit effort (CPUE) resulting in lower or higher catch of target species. In the event that CPUE is reduced, some recreational fishermen may choose not to fish for sharks.

Alternative	Net Economic Benefits	Net Economic Cost
A7 – Allow only catch and release of all Atlantic HMS managed sharks. Anglers could fish for and target sharks but retention of recreationally-caught sharks would be prohibited.	Recreational anglers practicing catch-and-release fishing for sharks may experience more interactions with sharks if shark stocks increase as a result of a prohibition on retention.	Only allowing catch and release of authorized sharks in the recreational fishery could impact some fishermen that retain sharks recreationally and tournaments that award points for landing sharks. Thus, prohibiting retention of Atlantic sharks in the recreational shark fisheries could drastically alter the nature of recreational shark fishing and reduce incentives to fish for sharks. Recreational anglers would not benefit from the experience of keeping sharks, particularly trophy size fish, thus resulting in significant economic costs associated with the loss of recreational consumer surplus and business activity associated with prohibiting the retention of all sharks for recreational anglers.
Commercial Measures		
B1 – No Action. Do not implement management measures to end overfishing and rebuild dusky sharks in the commercial Atlantic pelagic longline fishery	No change in economic benefits.	If more restrictive measures are required in the long-term under MSA or other statutes such as the Endangered Species Act, moderate adverse socioeconomic impacts may occur.
B2 – Fishermen with an Atlantic shark commercial permit and PLL gear onboard would be limited to 750 hooks per pelagic longline set and no more than 800 assembled gangions onboard at any time.	There would be unquantified benefits to the public associated with reducing interactions with overfished dusky sharks. These benefits include passive use values, such as shark viewing trips, and nonuse values including knowing that shark species remain for future generations (bequest value) and values placed on knowing shark species will continue to survive (existence value).	This alternative would likely have adverse socioeconomic impacts on fishermen targeting dolphin fish, because these fishermen on average use 1,056 hooks per set. If NMFS implemented this alternative, fishermen targeting dolphin fish with pelagic longline gear would have to reduce their number of hooks by approximately 30 percent per set, which may result in a similar percent reduction in set revenue or could result in increased operating costs if fishermen decide to offset the limited number of hooks with more fishing sets.
B3 – Fishermen with an Atlantic shark commercial permit with pelagic longline gear onboard must release all sharks not being retained using a dehooker or cutting the gangion less than three feet from the hook. (Preferred Alternative)	There would be unquantified benefits to the public associated with reducing mortality resulting from dusky shark interactions by the pelagic longline fleet. These benefits include passive use values, such as shark viewing trips, and nonuse values	Currently, it is common practice in the pelagic longline fishery to release sharks that are not going to be retained (especially larger sharks) by cutting the gangion, but they currently usually do not cut the gangions so only three feet remains so there

Alternative	Net Economic Benefits	Net Economic Cost
	including knowing that shark species remain for future generations (bequest value) and values placed on knowing shark species will continue to survive (existence value).	might be a slight learning curve associated with cutting the gangions no more than three feet from the hook. Therefore, the socioeconomic impacts associated with cutting the gangion to release sharks in this alternative would be minor in the short-term as the fishermen adjust to this new practice. Using a dehooker to release sharks in the pelagic longline fishery is a less common practice, therefore, there may be more of a learning curve that would make using this technique more time consuming and making fishing operations less efficient. Although this may be an initial issue, NMFS expects that these inefficiencies would be minimal and that fishermen would become adept in using a dehooker to release sharks over time given they are all adept at using a dehooker to release protected species.
B4 Develop dusky shark hotspot areas for vessels fishing with pelagic longline gear		
B4a – Prohibit the use of pelagic longline gear in HMS fisheries in a portion of the Charleston Bump during the month of May ("Charleston Bump Hotspot May").	There would be unquantified benefits to the public associated with reducing interactions with overfished dusky sharks. These benefits include passive use values, such as shark viewing trips, and nonuse values including knowing that shark species remain for future generations (bequest value) and values placed on knowing shark species will continue to survive (existence value). This alternative would result in fewer discards of dusky sharks, and thus reduce the ecological costs associated with dead discards and the operational costs associated with handling discards.	Could reduce annual revenue from fishing in the Charleston Bump Hotspot May by $382,000 to $702,000 depending on the amount of effort redistribution that occurs. In addition to direct impacts to vessels owners, operators, and crew members, this alternative would have moderate, adverse indirect impacts in the short and long-term on fish dealers, processors, bait/gear suppliers, and other shore-based businesses impacted by reduced fishing opportunities for pelagic longline vessel owners that would have fished in the hotspot area.
B4b – Prohibit the use of pelagic longline gear in HMS fisheries in the vicinity of the Cape Hatteras Special Research/Hatteras Shelf Area during the month of May ("Hatteras Shelf Hotspot May")	There would be unquantified benefits to the public associated with reducing interactions with overfished dusky sharks. These benefits include passive use values, such as shark viewing trips, and nonuse values including knowing that shark species remain for future generations (bequest value) and values placed on knowing shark	Could reduce annual revenue from fishing in the Hatteras Shelf Hotspot May by $252,000 to $419,000 depending on the amount of effort redistribution that occurs. In addition to direct impacts to vessels owners, operators, and crew members, this alternative would have moderate, adverse indirect impacts in the short and long-term

Alternative	Net Economic Benefits	Net Economic Cost
	species will continue to survive (existence value). This alternative would result in fewer discards of dusky sharks, and thus reduce the ecological costs associated with dead discards and the operational costs associated with handling discards.	on fish dealers, processors, bait/gear suppliers, and other shore-based businesses impacted by reduced fishing opportunities for pelagic longline vessel owners that would have fished in the hotspot area.
B4c – Prohibit the use of pelagic longline gear in HMS fisheries in the vicinity of the Cape Hatteras Special Research/Hatteras Shelf Area during the month of June ("Hatteras Shelf Hotspot June")	There would be unquantified benefits to the public associated with reducing interactions with overfished dusky sharks. These benefits include passive use values, such as shark viewing trips, and nonuse values including knowing that shark species remain for future generations (bequest value) and values placed on knowing shark species will continue to survive (existence value). This alternative would result in fewer discards of dusky sharks, and thus reduce the ecological costs associated with dead discards and the operational costs associated with handling discards.	Could reduce annual revenue from fishing in the Hatteras Shelf Hotspot June by $148,000 to $283,000 depending on the amount of effort redistribution that occurs. In addition to direct impacts to vessels owners, operators, and crew members, this alternative would have moderate, adverse indirect impacts in the short and long-term on fish dealers, processors, bait/gear suppliers, and other shore-based businesses impacted by reduced fishing opportunities for pelagic longline vessel owners that would have fished in the hotspot area.
B4d – Prohibit the use of pelagic longline gear in the HMS fisheries in the vicinity of the Cape Hatteras Special Research/Hatteras Shelf Area during the month of November ("Hatteras Shelf Hotspot November")	There would be unquantified benefits to the public associated with reducing interactions with overfished dusky sharks. These benefits include passive use values, such as shark viewing trips, and nonuse values including knowing that shark species remain for future generations (bequest value) and values placed on knowing shark species will continue to survive (existence value). This alternative would result in fewer discards of dusky sharks, and thus reduce the ecological costs associated with dead discards and the operational costs associated with handling discards.	Could reduce annual revenue from fishing in the Hatteras Shelf Hotspot November by $81,000 to $120,000 depending on the amount of effort redistribution that occurs. In addition to direct impacts to vessels owners, operators, and crew members, this alternative would have moderate, adverse indirect impacts in the short and long-term on fish dealers, processors, bait/gear suppliers, and other shore-based businesses impacted by reduced fishing opportunities for pelagic longline vessel owners that would have fished in the hotspot area.
B4e – Prohibit the use of pelagic longline gear in HMS fisheries in three distinct closures in the vicinity of the Mid Atlantic Bight Canyons ("Canyons Hotspot October") during the month of October	There would be unquantified benefits to the public associated with reducing interactions with overfished dusky sharks. These benefits include passive use values, such as shark viewing trips, and nonuse values including knowing that shark species remain for future generations (bequest value) and values placed on knowing shark	Could reduce annual revenue from fishing in the Canyons Hotspot October by $637,000 to $238,000 depending on the amount of effort redistribution that occurs. In addition to direct impacts to vessels owners, operators, and crew members, this alternative would have moderate, adverse indirect impacts in the short and long-term

Alternative	Net Economic Benefits	Net Economic Cost
	species will continue to survive (existence value). This alternative would result in fewer discards of dusky sharks, and thus reduce the ecological costs associated with dead discards and the operational costs associated with handling discards.	on fish dealers, processors, bait/gear suppliers, and other shore-based businesses impacted by reduced fishing opportunities for pelagic longline vessel owners that would have fished in the hotspot area.
B4f – Prohibit the use of pelagic longline gear in HMS fisheries in an area in the vicinity of the existing Northeastern closed area during the month of July ("Southern Georges Banks Hotspot July")	There would be unquantified benefits to the public associated with reducing interactions with overfished dusky sharks. These benefits include passive use values, such as shark viewing trips, and nonuse values including knowing that shark species remain for future generations (bequest value) and values placed on knowing shark species will continue to survive (existence value). This alternative would result in fewer discards of dusky sharks, and thus reduce the ecological costs associated with dead discards and the operational costs associated with handling discards.	Could reduce annual revenue from fishing in the Southern Georges Banks Hotspot July by $290,000 to $498,000 depending on the amount of effort redistribution that occurs. In addition to direct impacts to vessels owners, operators, and crew members, this alternative would have moderate, adverse indirect impacts in the short and long-term on fish dealers, processors, bait/gear suppliers, and other shore-based businesses impacted by reduced fishing opportunities for pelagic longline vessel owners that would have fished in the hotspot area.
B4g – Prohibit the use of pelagic longline gear in HMS fisheries in an area in the vicinity of the existing Northeastern closed area during the month of August ("Southern Georges Banks Hotspot August")	There would be unquantified benefits to the public associated with reducing interactions with overfished dusky sharks. These benefits include passive use values, such as shark viewing trips, and nonuse values including knowing that shark species remain for future generations (bequest value) and values placed on knowing shark species will continue to survive (existence value). This alternative would result in fewer discards of dusky sharks, and thus reduce the ecological costs associated with dead discards and the operational costs associated with handling discards.	Could reduce annual revenue from fishing in the Southern Georges Banks Hotspot August by $210,000 to $429,000 depending on the amount of effort redistribution that occurs. In addition to direct impacts to vessels owners, operators, and crew members, this alternative would have moderate, adverse indirect impacts in the short and long-term on fish dealers, processors, bait/gear suppliers, and other shore-based businesses impacted by reduced fishing opportunities for pelagic longline vessel owners that would have fished in the hotspot area.
B4h – Prohibit the use of pelagic longline gear in HMS fisheries in a portion of the Charleston Bump during the month of November ("Charleston Bump Hotspot November")	There would be unquantified benefits to the public associated with reducing interactions with overfished dusky sharks. These benefits include passive use values, such as shark viewing trips, and nonuse values including knowing that shark species remain for future generations (bequest value) and values placed on knowing shark	Could reduce annual revenue from fishing in the Charleston Bump Hotspot November by $87,000 to $225,000 depending on the amount of effort redistribution that occurs. In addition to direct impacts to vessels owners, operators, and crew members, this alternative would have moderate, adverse indirect impacts in the short and long-term

Alternative	Net Economic Benefits	Net Economic Cost
	species will continue to survive (existence value). This alternative would result in fewer discards of dusky sharks, and thus reduce the ecological costs associated with dead discards and the operational costs associated with handling discards.	on fish dealers, processors, bait/gear suppliers, and other shore-based businesses impacted by reduced fishing opportunities for pelagic longline vessel owners that would have fished in the hotspot area.
B4i – Conditional access to hot spots: Fishermen who report or are observed interacting with the fewest dusky sharks in a year would be allowed into the Hotspots with an observer onboard.	There would be unquantified benefits to the public associated with reducing interactions with overfished dusky sharks. These benefits include passive use values, such as shark viewing trips, and nonuse values including knowing that shark species remain for future generations (bequest value) and values placed on knowing shark species will continue to survive (existence value). This alternative could result in fewer discards of dusky sharks, and thus reduce the ecological costs associated with dead discards. There would be beneficial economic impacts associated with the added option for vessels to potentially fish in these areas, which could potentially increase landings revenues and decrease fishing costs by providing access to closer and/or more productive fishing areas.	Could reduce annual revenue from fishing in the various hot spot areas depending on the number of vessels excluded from the hotspots due to higher dusky interactions and the amount of effort redistribution that occurs. In addition to direct impacts to vessels owners, operators, and crew members, this alternative would have moderate, adverse indirect impacts in the short and long-term on fish dealers, processors, bait/gear suppliers, and other shore-based businesses impacted by reduced fishing opportunities for pelagic longline vessel owners that would have fished in the hotspot area.
B4j – Bycatch caps: Every Hotspot would have a set number of dusky sharks that could be caught (bycatch cap). Fishermen could fish in the Hotspots with an observer onboard. Once a bycatch cap is reached, the Hotspot would be closed to pelagic longline fishing.	There would be unquantified benefits to the public associated with reducing interactions with overfished dusky sharks. These benefits include passive use values, such as shark viewing trips, and nonuse values including knowing that shark species remain for future generations (bequest value) and values placed on knowing shark species will continue to survive (existence value). This alternative could result in fewer discards of dusky sharks, and thus reduce the ecological costs associated with dead discards.	Could reduce annual revenue from fishing in the various hot spot areas depending on the number of hotspots where bycatch cap limits are reached, the timing of those potential closures during the year, and the amount of effort redistribution that occurs after the closures. In addition to direct impacts to vessels owners, operators, and crew members, this alternative would have moderate, adverse indirect impacts in the short and long-term on fish dealers, processors, bait/gear suppliers, and other shore-based businesses impacted by reduced fishing opportunities for pelagic longline vessel owners that would have fished in the hotspot area.
B4 – Total overall dusky hotspot closure areas for	There would be unquantified benefits to the public	Could reduce annual revenue from fishing in all the

Alternative	Net Economic Benefits	Net Economic Cost
vessels fishing with PLL gear	associated with reducing interactions with overfished dusky sharks. These benefits include passive use values, such as shark viewing trips, and nonuse values including knowing that shark species remain for future generations (bequest value) and values placed on knowing shark species will continue to survive (existence value). This alternative would result in fewer discards of dusky sharks, and thus reduce the ecological costs associated with dead discards and the operational costs associated with handling discards.	hotspots by $1.69 million to $3.31 million depending on the amount of effort redistribution that occurs. In addition to direct impacts to vessels owners, operators, and crew members, this alternative would have moderate, adverse indirect impacts in the short and long-term on fish dealers, processors, bait/gear suppliers, and other shore-based businesses impacted by reduced fishing opportunities for pelagic longline vessel owners that would have fished in the hotspot areas.
B5 – *Require completion of a shark identification and fishing regulation training as a new part of all Safe Handling and Release Workshops for HMS PLL, BLL, and shark gillnet vessel owners and operators. (Preferred Alternative)*	Focused education on the HMS PLL, BLL, and shark gillnet vessel owners and operators would likely result in unquantified benefits to the public associated with reducing interactions with overfished dusky sharks as a result of improved awareness and education.	The annual cost of conducting this training course in conjunction with current Protected Species Safe Handling, Release, and Identification workshops would be approximately $9,000 per additional workshop.
B6 – *Increase dusky shark outreach and awareness through development of additional commercial fishery outreach materials, and require PLL, BLL, and gillnet vessels to abide by a dusky shark fleet communication and relocation protocol. (Preferred Alternative)*	These requirements would not cause a substantial change to current fishing operations, but have the potential to help fishermen become more adept in avoiding dusky sharks. If fishermen become better at avoiding dusky sharks, there is the possibility that target catch could increase.	The costs of the alternative include requiring vessels engaged in pelagic longline, bottom longline, and shark gillnet fishing to have a NMFS-approved shark placard onboard, and establishing a communication and fishing set relocation protocol following interactions with dusky sharks, are anticipated to be neutral in the short- and long-term. The requirement to move the subsequent fishing set one nautical mile from where a previous dusky shark interaction occurred could move fishermen away from areas where they would prefer to fish and it could increase fuel usage and fuel costs.
B7 – Request that certain states (Virginia, Maryland, Delaware, and New Jersey) and the ASMFC extend the end of existing shark closure from July 15 to July 31.	There would be unquantified benefits to the public associated with reducing interactions with overfished dusky sharks by bottom longline fishing in this region. These benefits include passive use values, such as shark viewing trips, and nonuse values including knowing that shark species remain for future generations (bequest	Based on 2014 ex-vessel price, the annual gross revenues loss for aggregated LCS and hammerhead shark meat to the regional fleet in revenues due to an extended closure date would be $847, while the shark fins would be $207. Thus the total loss annual gross revenue for aggregated LCS and

Alternative	Net Economic Benefits	Net Economic Cost
	value) and values placed on knowing shark species will continue to survive (existence value).	hammerhead sharks would be $1,054
B8 – Close Atlantic HMS PLL fishery	There would be unquantified benefits to the public associated with reducing interactions with overfished dusky sharks and a large numbers of HMS and non-HMS, including protected resources such as sea. These benefits include passive use values, such as shark viewing trips, and nonuse values including knowing that shark species remain for future generations (bequest value) and values placed on knowing shark species will continue to survive (existence value). This alternative would result in fewer discards of dusky sharks and many other species, and thus reduce the ecological costs associated with dead discards and the operational costs associated with handling discards.	Closing the Atlantic HMS PLL fishery would likely reduce fishing revenues by approximately $34 million annually. This alternative would have major, adverse indirect impacts in the short- and long-term on fish dealers, processors, bait/gear suppliers, and other shore-based businesses in the vicinity of the fishing ports impacted by reduced fishing opportunities for longline vessel owners.
B9 – Require the use of circle hooks by all HMS directed shark permit holders in the BLL fishery. (Preferred Alternative)	There would be unquantified benefits to the public by reducing the mortality associated with interactions associated with overfished dusky sharks. These benefits include passive use values, such as shark viewing trips, and nonuse values including knowing that shark species remain for future generations (bequest value) and values placed on knowing shark species will continue to survive (existence value). This alternative would result in fewer dead discards of dusky sharks since using circle hooks results in a greater probability that hooked dusky sharks can be released alive.	There is a negligible cost associated with switching from J-hooks to circle hooks. However, there is some indication that the use of circle hooks may reduce catch per unit effort (CPUE) resulting in lower catch of target species. To the extent that CPUE is reduced, some commercial fishermen using BLL gear may experience reduced landings and associated revenue with the use of circle hooks.
B10 – Implement Individual Dusky Shark Bycatch Quotas (IDQs) for the commercial pelagic and bottom longline fisheries.	It is not clear that an IDQ system without an appropriate scientific basis would actually reduce interactions with dusky sharks. To the extent that any reduction actually occurred, there would be unquantified benefits to the public associated with	Some vessels would be constrained by the amount of individual quota they are allocated and this could reduce their annual revenue. If vessel owners are only allocated a very low amount of IDQs, it is very unlikely that an active

Alternative	Net Economic Benefits	Net Economic Cost
	reducing interactions with overfished dusky sharks and a large numbers of HMS and non-HMS, including protected resources such as sea. These benefits include passive use values, such as shark viewing trips, and nonuse values including knowing that shark species remain for future generations (bequest value) and values placed on knowing shark species will continue to survive (existence value). Vessels that do not often interact with dusky sharks would likely benefit from the reduced risk of a fishery closure resulting from the higher dusky shark interactions of other vessels in the fleet.	trading market for IDQs will emerge. The initial allocations would likely be insufficient for many vessels to maintain their current levels of fishing activity and they may not be able to find IDQs to lease or have insufficient capital to lease a sufficient amount of IDQs. Some vessel owners may view the risk of exceeding their IDQ allocations and the associated costs of acquiring additional quota to outweigh the potential profit from fishing, so they may opt to not continue participating in the fishery. The annual transaction costs associated with matching lessor and lessees, the costs associated with drafting agreements, and the uncertainty vessel owners would face regarding quota availability would reduce some of the economic benefits associated with leasing quota. There would also be increased costs associated with bottom longline vessels obtaining and installing EM and VMS units. Some bottom longline vessel owners might have to consider obtaining new vessels if their current vessels cannot be equipped with EM and VMS. There would be increased costs associated with VMS reporting of dusky interactions. They would also need to ship hard drives after each trip and consider acquiring extra hard drives to avoid not having one available when they want to go on a subsequent trip.

6.6 Conclusions

As noted above under E.O. 12866, a regulation is a "significant regulatory action" if it is likely to: (1) have an annual effect on the economy of $100 million or more or adversely affect in a material way the economy, a sector of the economy, productivity, competition, jobs, the environment, public health or safety, or state, local, or tribal governments or communities; (2) create a serious inconsistency or otherwise interfere with an action taken or planned by another agency; and (3) materially alter the budgetary impact of entitlements, grants, user fees, or loan programs or the legal mandates, the President's priorities, or the principles set forth in the Executive Order; or, (4) raise novel legal or policy issues arising out of legal mandates, the president's priorities, or the principles set forth in this Executive Order. The preferred alternatives described in this document do not meet the above criteria. The preferred alternatives would have an annual effect on the economy less than $100 million and would not adversely affect the aforementioned parameters (Table 6.1). The preferred alternatives would also not create an inconsistency or interfere with an action taken by another agency. Furthermore, the preferred alternatives would not materially alter the budgetary impact of entitlements, grants, user fees, the President's priorities, or the principles set forth in E.O. 12866. Nor would the proposed regulations raise any unique legal or policy issues. The Secretary, through NMFS, has managed Atlantic HMS since 1990. In addition, NMFS has participated in international efforts to develop management measures for stocks affected by multiple nations. The preferred alternatives and other alternatives do not materially depart from this management approach. Under E.O. 12866, the preferred alternatives described in this document have been determined to be not significant for the purposes of E.O. 12866. The Office of Management and Budget (OMB) concurred with this determination provided in the listing memo for this proposed rule. A summary of the expected net economic benefits and costs of each alternative, which are based on supporting text in Chapter 4.0, can be found in Table 6.1.

7.0 Initial Regulatory Flexibility Analysis

The Initial Regulatory Flexibility Analysis (IRFA) is conducted to comply with the Regulatory Flexibility Act (5 USC 601 et. seq.) (RFA). The goal of the RFA is to minimize the economic burden of federal regulations on small entities. To that end, the RFA directs federal agencies to assess whether the proposed regulation is likely to result in significant economic impacts to a substantial number of small entities, and identify and analyze any significant alternatives to the proposed rule that accomplish the objectives of applicable statutes and minimizes any significant effects on small entities. Certain data and analyses required in an IRFA are also included in other chapters of this EIS. Therefore, this IRFA incorporates by reference the economic analyses and impacts in Chapter 4.0 of this EIS and the summary information in Chapter 6.0.

7.1 Description of the Reasons Why Action is Being Considered

Please see Chapter 1.0 for a description of the need for these proposed management actions. The proposed action is designed to address the overfished/overfishing occurring status of the dusky shark stock. NMFS previously considered alternatives for management of dusky sharks in Draft Amendment 5, which proposed measures that were designed to reduce fishing mortality and effort in order to rebuild various overfished Atlantic shark species, including dusky sharks, while ensuring that a limited sustainable shark fishery for certain species could be maintained consistent with legal obligations and the 2006 Consolidated HMS FMP. After reviewing all of the comments received, NMFS decided to conduct further analyses on measures pertaining to dusky sharks in a separate FMP amendment, EIS, and proposed rule.

7.2 Statement of the Objectives of, and Legal Basis for, the Proposed Rule

Please see Chapter 1.0 for a full description of the objectives of this proposed amendment to the 2006 Consolidated HMS FMP and implementing regulations, including proposed fishery management actions. NMFS has identified the following two objectives with regard to this proposed action, to end overfishing for dusky sharks and to make any necessary modifications to the rebuilding plan for dusky sharks to ensure that fishing mortality levels for dusky sharks are maintained at or below levels that would result in a 70 percent probability of rebuilding in the timeframe recommended by the assessment.

The legal basis for this proposed rule stems from the dual authority of the Magnuson-Stevens Act and ATCA. Under the Magnuson-Stevens Act, the NMFS must, consistent with ten National Standards, manage fisheries to maintain optimum yield (OY) by rebuilding overfished fisheries and preventing overfishing. Under ATCA, NMFS is authorized to promulgate regulations, as may be necessary and appropriate to carry out binding recommendations of the International Commission for the Conservation of Atlantic Tunas (ICCAT). Additionally, any management measures must be consistent with other domestic laws including, but not limited to, the National Environmental Policy Act (NEPA), the Endangered Species Act (ESA), the Marine Mammal Protection Act (MMPA), and the Coastal Zone Management Act (CZMA).

7.3 Description and Estimate of the Number of Small Entities to Which the Proposed Rule Would Apply

This proposed rule is expected to directly affect commercial pelagic longline, bottom longline, shark gillnet, and recreational shark fishing vessels that possess HMS permits. For the pelagic longline vessels, these are vessels that possess an Atlantic shark limited access permit, an Atlantic swordfish limited access permit, and an Atlantic Tunas Longline category permit. Because pelagic longline fishermen must hold all three permits in order to fish, for the purposes of this discussion, NMFS will focus on Atlantic Tunas Longline category permit holders. For the recreational management measures, most commonly, the proposed management measures would only directly apply to small entities that are Charter/Headboat permit holders that provide for-hire trips that target sharks. Other HMS recreational fishing permit holders and considered individuals, not small entities.

For RFA purposes only, NMFS has established a small business size standard for businesses, including their affiliates, whose primary industry is commercial fishing (see 50 CFR § 200.2). A business primarily engaged in commercial fishing (NAICS code 11411) is classified as a small business if it is independently owned and operated, is not dominant in its field of operation (including its affiliates), and has combined annual receipts not in excess of $11 million for all its affiliated operations worldwide. The Small Business Administration (SBA) has established size standards for all other major industry sectors in the U.S., including the scenic and sightseeing transportation (water) sector (NAICS code 487210, for-hire), which includes charter/party boat entities. The Small Business Administration (SBA) has defined a small charter/party boat entity as one with average annual receipts (revenue) of less than $7.5 million.

Regarding those entities that would be directly affected by the recreational management measures, HMS Angling (Recreational) category permits are typically obtained by individuals who are not considered businesses or small entities for purposes of the RFA. Additionally, while Atlantic Tunas General category and Swordfish General commercial permit holders hold commercial permits and are usually considered small entities, because the proposed management measures would only affect them when they are fishing under the recreational regulations for sharks during a registered tournament, NMFS is not considering them small entities for this rule. However, because vessels with the HMS Charter/Headboat category permit are for-hire vessels, these permit holders can be regarded as small entities for RFA purposes. At this time, NMFS is unaware of any charter/headboat businesses that could exceed the SBA receipt/revenue thresholds for small entities. Overall, the recreational alternatives would impact a portion of the 3,596 HMS Charter/Headboat permit holders interested in shark fishing.

Regarding those entities that would be directly affected by the commercial management measures, the average annual revenue per active pelagic longline vessel is estimated to be $187,000 based on the 170 active vessels between 2006 and 2012 that produced an estimated $31.8 million in revenue annually. The maximum annual revenue for any pelagic longline vessel between 2006 and 2015 was less than $1.9 million, well below the NMFS small business size standard for commercial fishing businesses of $11 million. Other non-longline HMS commercial fishing vessels typically generally earn less revenue than pelagic longline vessels. Therefore, NMFS considers all Atlantic HMS commercial permit holders to be small entities.

The preferred commercial alternatives would apply to the 280 Atlantic tunas Longline category permit holders and 224 directed shark permit holders. Of these 280 permit holders, only 136 have Individual Bluefin Quotas (IBQ) shares required to go commercial pelagic longline fishing.

NMFS has determined that the preferred alternatives would not likely directly affect any small organizations or small government jurisdictions defined under RFA. More information regarding the description of the fisheries affected, and the categories and number of permit holders, can be found in Chapter 3.0.

7.4 Description of the Projected Reporting, Record-Keeping, and Other Compliance Requirements of the Proposed Rule, Including an Estimate of the Classes of Small Entities Which Would Be Subject to the Requirements of the Report or Record

Several of the preferred alternatives in Draft Amendment 5b would result in reporting, record-keeping, and compliance requirements that may require new Paperwork Reduction Act (PRA) filings and some of the preferred alternatives would modify existing reporting and record-keeping requirements, and add compliance requirements. NMFS estimates that the number of small entities that would be subject to these requirements would include the Atlantic tuna Longline category (280), Directed and Incidental Shark Limited Access (224 and 275, respectively), and HMS Charter/Headboat category (3,596) permit holders.

7.4.1 Recreational Alternatives

The preferred recreational alternative, A2, would require recreational fishermen targeting shark to obtain a shark endorsement in addition to other existing permit requirements. Obtaining the shark endorsement would be included in the online HMS permit application and renewal processes and would require the applicant to complete a short quiz focusing on shark species identification. The applicant would simply need to indicate the desire to obtain the shark endorsement after which he or she would be directed to a short online quit that would take minimal time to complete. Adding the endorsement to the permit and requiring applicants to take the online quiz to obtain the endorsement will require a modification to the existing PRA for the permits.

7.4.2 Commercial Measures Alternatives

Alternative B5, a preferred alternative, would require completion of shark identification and fishing regulation training as a new part of all Safe Handling and Release Workshops for HMS PLL, BLL, and shark gillnet vessel owners and operators. The training course would provide information regarding shark identification and regulations, as well as best practices to avoid interacting with dusky sharks and how to minimize mortality of dusky sharks caught as bycatch. Compliance with this course requirement would be mandatory and be a condition for permit renewal. A certificate would be issued to all commercial pelagic longline vessel owners

indicating compliance with this requirement and the certificate would be required for permit renewal.

Alternative B6, a preferred alternative, would require that all vessels with an Atlantic shark commercial permit and fishing with pelagic longline, bottom longline, or shark gillnet gear abide by a dusky shark fleet communication and relocation protocol. The protocol would require vessels to report the location of dusky shark interactions over the radio to other pelagic longline, bottom longline, or shark gillnet vessels in the area and that subsequent fishing sets on that fishing trip could be no closer than 1 nautical mile (nm) from where the encounter took place.

7.5 Identification of All Relevant Federal Rules Which May Duplicate, Overlap, or Conflict with the Proposed Rule

Fishermen, dealers, and managers in these fisheries must comply with a number of provisions in international agreements as implemented, domestic laws, and other FMPs. These include, but are not limited to, the Magnuson-Stevens Act, ATCA, the High Seas Fishing Compliance Act, the Marine Mammal Protection Act, Endangered Species Act, the National Environmental Policy Act, the Paperwork Reduction Act, and the Coastal Zone Management Act. The proposed rule would not conflict with any relevant regulations, federal or otherwise.

7.6 Description of Any Significant Alternatives to the Proposed Rule That Accomplish the Stated Objectives of the Applicable Statutes and That Minimize Any Significant Economic Impact of the Proposed Rule on Small Entities

One of the requirements of an IRFA is to describe any alternatives to the proposed rule which accomplish the stated objectives and which minimize any significant economic impacts. These impacts are discussed below and in Chapter 4.0 of this document. Additionally, the Regulatory Flexibility Act (5 U.S.C. § 603 (c) (1)-(4)) lists four general categories of "significant" alternatives that would assist an agency in the development of significant alternatives. These categories of alternatives are:

1. Establishment of differing compliance or reporting requirements or timetables that take into account the resources available to small entities;
2. Clarification, consolidation, or simplification of compliance and reporting requirements under the rule for such small entities;
3. Use of performance rather than design standards; and,
4. Exemptions from coverage of the rule for small entities.

In order to meet the objectives of this proposed rule, consistent with all legal requirements, NMFS cannot exempt small entities or change the reporting requirements only for small entities because all the entities affected are considered small entities. Thus, there are no alternatives discussed that fall under the first and fourth categories described above. Under the third category, "use of performance rather than design standards," NMFS considers Alternative B5,

which would provide additional training to pelagic longline, bottom longline, and shark gillnet fishermen, to be a performance standard rather than a design standard. As described below, NMFS analyzed several different alternatives in this proposed rulemaking and provides the rationale for identifying the preferred alternative to achieve the desired objective.

In this rulemaking, NMFS considered two different categories of alternatives. The first category, recreational alternatives, covers seven main alternatives that address various strategies of reducing dusky shark mortality in the recreational fishery. The second category of alternatives, commercial measures, considers nine main alternatives that address various strategies of reducing dusky shark mortality in the commercial fishery.

The potential impacts these alternatives may have on small entities have been analyzed and are discussed in the following sections. The preferred alternatives include: Alternative A2, Alternative A6a, Alternative B3, Alternative B5, Alternative B6, and Alternative B9. The economic impacts that would occur under these preferred alternatives were compared with the other alternatives to determine if economic impacts to small entities could be minimized while still accomplishing the stated objectives of this rule.

7.6.1 Recreational Alternatives

Alternative A1

Alternative A1, the no action alternative, would not implement any management measures in the recreational shark fishery to decrease mortality of dusky sharks, likely resulting in direct, short- and long-term neutral economic impacts. Since there would be no changes to the fishing requirements, there would be no economic impacts on small entities. If more restrictive measures are required in the long-term under MSA or other statutes such as the Endangered Species Act, moderate adverse economic impacts may occur. However, overfishing would continue under this alternative, thus, NMFS does not prefer this alternative at this time.

Alternative A2 - Preferred Alternative

Under Alternative A2, a preferred alternative, HMS Angling and Charter/Headboat permit holders would be required to obtain a shark endorsement, which requires completion of a short online shark identification and fishing regulation training course in order to retain. Obtaining the shark endorsement would be included in the online HMS permit application and renewal processes and would require the applicant to complete a training course focusing on shark species identification and fishing regulations. This alternative would likely result in no substantive economic impacts since there would be no additional cost to the applicant and only a small additional investment in time. Obtaining the shark endorsement would be a part of the normal HMS permit application or renewal. The applicant would simply need to indicate the desire to obtain the shark endorsement after which he or she would be directed to a short online training course that would take minimal time to complete. The goal of the training course is to help prevent anglers from landing prohibited or undersized sharks, and thus, help rebuild stocks. Furthermore, the list of shark endorsement holders would allow for more targeted surveys and outreach, likely increasing the reliability of recreational shark catch estimates. This preferred

alternative helps achieve the objectives of this proposed rule while minimizing any significant economic impacts on small entities.

Alternative A3

Alternative A3 would require participants in the recreational shark fishery (Angling and Charter/Headboat permit holders) to carry an approved shark identification placard on board the vessel when fishing for sharks. This alternative would likely result in short- and long-term minor economic impacts. The cost of obtaining a placard, whether by obtaining a pre-printed one or self-printing, would be modest. To comply with the requirement of this alternative, the angler would need to keep the placard on board the vessel when fishing for sharks and, since carrying other documents such as permits and boat registration is already required, this is unlikely to be a large inconvenience. This alternative would have slightly more economic impacts than Alternative A2 on small entities and would likely be less effective than the training course in Alternative A2.

Alternative A4

Under Alternative A4, NMFS would extend the prohibition on the retention of ridgeback sharks to include the rest of the ridgeback sharks, namely oceanic whitetip, tiger sharks, and smoothhound sharks, all of which are currently allowed to be retained by recreational shark fishermen (HMS Angling and Charter/Headboat permit holders). While this alternative would simplify compliance for the majority of fishermen targeting sharks, it could also potentially have adverse economic impacts for a small subset of fishermen that target oceanic whitetip, tiger, and smoothhound sharks. These adverse impacts would be quite small, however, for oceanic whitetip and tiger sharks. However, based on MRIP data, this alternative could have considerable impacts on fishermen targeting smoothhound sharks. Presumably, state-permitted anglers that do not hold an HMS federal permit are responsible for some of the catch and, for species such as smooth dogfish that are often found almost in state waters, anglers with only state permit may be responsible for most of the catch. Recreational fishermen with only state-issued permits would still be able to retain smoothhound sharks (those that hold an HMS permit must abide by federal regulations, even in state waters). Thus, Alternative A4 would likely result in both direct short- and long-term, minor adverse economic impacts on HMS Charter/Headboat operators if prohibiting landing of additional shark species reduces demand for fishing charters. While this alternative may have greater economic impacts than Alternative A3, it may be effective at achieving the objective of reducing dusky shark mortality in the recreational fishery.

Alternative A5

Under Alternative A5, the minimum recreational size limit for authorized shark species, except for Atlantic sharpnose, bonnethead, and hammerhead (great, scalloped, and smooth) sharks, would increase from 54 to 89 inches fork length. Under this alternative, increasing the recreational size limit would likely result both direct short- and long-term, moderate adverse economic impacts for recreational fishermen, charter/headboat operators, and tournament operators. Because many shark species have a maximum size below an 89 inch size limit, there could be reduced incentive to fish recreationally for sharks due to the decreased potential to

legally land these fish. Increasing the minimum size for retention would also impact the way that tournaments and charter vessels operate. While the impacts of an 89 inch fork length minimum size on tournaments awarding points for pelagic sharks may be lessened because these tournament participants target larger sharks, such as shortfin mako, blue, and thresher, that grow to larger than 89 inches fork length, this may not be the case for tournaments targeting smaller sharks. Tournaments that target smaller sharks, especially those that target shark species that do not reach sizes exceeding 89 inches fork length such as blacktip sharks, may be heavily impacted by this alternative. Reduced participation in such tournaments could potentially decrease the amount of monetary prizes offered to winners. Thus, implementation of this management measure could significantly alter the way some tournaments and charter vessels operate, or reduce both opportunities to fish for sharks and the drastically reduce general interest and demand for recreational shark fishing, which could create adverse economic impacts. For the aforementioned reasons, NMFS does not prefer this alternative at this time.

Alternative A6

Under Alternative A6, circle hooks would be required for either all HMS permit holders fishing recreationally for sharks or all Atlantic HMS permit holders participating in fishing tournaments when targeting or retaining Atlantic sharks.

Alternative A6a- Preferred Alternative

Sub-alternative A6a is a preferred alternative. Relative to the total cost of gear and tackle for a typical fishing trip, the cost associated with switching from J hooks to circle hooks is negligible. Thus, the immediate cost in switching hook type is likely minimal. However, there is conflicting indication that the use of circle hooks may reduce or increase catch per unit effort (CPUE) resulting in lower catch of target species. In the event that CPUE is reduced, some recreational fishermen may choose not to fish for sharks or to enter tournaments that offer awards for sharks. These missed fishing opportunities could result in minor adverse economic impacts in the short- and long-term. However, since the economic impacts are minor and circle hooks would reduce fishing mortality for dusky sharks, NMFS prefers this alternative at this time.

Alternative A6b

Sub-Alternative Ab6 is similar to A6a, but instead of requiring circle hooks when deploying natural bait while using a wire or heavy (200 pound test or greater) monofilament or fluorocarbon leader outside of a fishing tournament it instead requires circle hooks when deploying a 5/0 or greater size hook to fish with natural bait outside of a fishing tournament. This use of the hook size standard to determine if the trip could be targeting sharks may result in more recreational trips requiring circle hooks than under alterative A6a, but many of those trips might actually not be targeting sharks, but instead other large pelagic fish. The use of a heavy leader is probably more correlated with angling activity that is targeting sharks.

Alternative A6c

Sub-Alternative A6c is similar to A6a and A6b, but restricted to requiring the use of circle hooks by all HMS permit holders participating in fishing tournaments that bestow points, prizes, or awards for sharks. This alternative would impact a smaller universe of recreational fishermen, so the adverse impacts are smaller. However, given the limited scope of this requirement, the benefits to reducing dusky shark mortality via the use of circle hooks are also more limited.

Alternative A7

Alternative A7 would prohibit HMS permit holders from retaining any shark species. Recreational fishermen may still fish for and target authorized shark species for catch and release. The large number of fishermen who already practice catch and release and the catch and release shark fishing tournaments currently operating would not be impacted. However, prohibiting retention of sharks could have major impacts on fishing behaviors and activity of other recreational shark fishermen and reduce their demand for charter/headboat trips. Only allowing catch and release of authorized sharks in the recreational fishery could impact some fishermen that retain sharks recreationally and tournaments that award points for landing sharks. Thus, prohibiting retention of Atlantic sharks in the recreational shark fisheries could drastically alter the nature of recreational shark fishing and reduce incentives to fish for sharks. Additionally, with reduced incentive to fish for sharks, this could negatively impact profits for the HMS Charter/Headboat industry. Because there could be major impacts to the recreational shark fisheries from this management measure, Alternative A7 would likely have direct short- and long-term, moderate adverse economic impacts on small business entities.

7.6.2 Commercial Alternatives

Alternative B1

Under Alternative B1, NMFS would not implement any measures to reduce dusky shark mortality in the commercial shark or HMS fisheries. Since no management measures would be implemented under this alternative, NMFS would expect fishing practices to remain the same and economic impacts to be neutral in the short-term. Dusky sharks are a prohibited species and fishermen are not allowed to harvest this species. Thus, even if dusky sharks continue to experience overfishing and the abundance declines as a result of this alternative, there would not be any economic impacts on the fishery in the short-term. If more restrictive measures are required in the long-term under MSA or other statutes such as the Endangered Species Act, moderate adverse economic impacts may occur.

Alternative B2

Under Alternative B2, HMS commercial fishermen would be limited to 750 hooks per pelagic longline set with no more than 800 assembled gangions onboard the vessel at any time. Based on average number of hooks per pelagic longline set data, the hook restriction in this alternative could have neutral economic impacts on fishermen targeting bigeye tuna, mixed tuna species, and mixed HMS species, because the average number of hooks used on pelagic longline sets

targeting these species is slightly above or below the limit considered in this alternative. This alternative would likely have adverse economic impacts on fishermen targeting dolphin fish, because these fishermen on average use 1,056 hooks per set. If NMFS implemented this alternative, fishermen targeting dolphin fish with pelagic longline gear would have to reduce their number of hooks by approximately 30 percent per set, which may result in a similar percent reduction in set revenue or could result in increased operating costs if fishermen decide to offset the limited number of hooks with more fishing sets. Overall, Alternative B2 would be expected to have short- and long-term minor adverse economic impacts on the pelagic longline fishery.

Alternative B3 - Preferred Alternative

Under Alternative B3, a preferred alternative, HMS commercial fishermen must release all sharks that are not being boarded or retained by using a dehooker, or by cutting the gangion no more than three feet from the hook. This alternative would have neutral to adverse economic impacts on commercial shark fishermen using pelagic longline gear. Currently, fishermen are required to use a dehooking device if a protected species is caught. This alternative would require this procedure to be used on all sharks that would not be retained, or fishermen would have to cut the gangion to release the shark. Currently, it is common practice in the pelagic longline fishery to release sharks that are not going to be retained (especially larger sharks) by cutting the gangion, but they usually do not cut the gangion so only 3 feet remain, so there might be a slight learning curve. Using a dehooker to release sharks in the pelagic longline fishery is a less common practice, therefore, there may be more of a learning curve that would make using this technique more time consuming and making fishing operations less efficient. Although this may be an initial issue, NMFS expects that these inefficiencies would be minimal and that fishermen would become adept in using a dehooker to release sharks over time given they are all adept at using a dehooker to release protected species. Thus, Alternative B3 would be expected to have short- and long-term neutral economic impacts on the pelagic longline fishery.

Alternative B4

Under Alternative B4, NMFS considered various dusky shark hotspot closures for vessels fishing with pelagic longline gear. The hotspot closures considered are the same areas that were analyzed in Draft Amendment 5 and the A5b Predraft. These hotspot closure alternatives are located where increased levels of pelagic longline interactions with dusky sharks had been identified based on HMS Logbook data. During the months that hotspot closures are effective, Atlantic shark commercial permit holders (directed or incidental) would not be able to fish with pelagic longline gear in these areas.

Alternative B4a

This alternative would define a rectangular area in a portion of the existing Charleston Bump time/area closure area, and prohibit the use of pelagic longline gear by all vessels during the month of May in that area. This alternative is expected to have moderate short and long-term direct adverse economic impacts on 46 vessels that have historically fished in this Charleston Bump area during the month of May. This closure would result in the loss of approximately

$15,250 in gross revenues per year per vessel assuming no redistribution of effort outside of the closed area.

However, it is likely that some of the vessels that would be impacted by this hotspot closure would redistribute their effort to other fishing areas. Based on natural breaks in the percentage of sets vessels made inside and outside of this alternative's hotspot closure area, NMFS estimated that if a vessel historically made less than 40 percent of its sets in the hotspot closure area, it would likely redistribute all of its effort. If a vessel made more than 40 percent but less than 75 percent of its sets in the hotspot closure area, it would likely redistribute 50 percent of its effort impacted by the hotspot closure area to other areas. Finally, if a vessel made more than 75 percent of its sets solely within the hotspot closure area, NMFS assumed the vessel would not likely shift its effort to other areas. Based on these individually calculated redistribution rates, the percentage of fishing in other areas during the gear restriction time period, the percentage of fishing in other areas during the hotspot closure time period, and the catch per unit effort for each vessel in each statistical area, NMFS estimated the potential landings associated with redistributed effort associated with fishing sets displaced by the hotspot closure area. The net loss in fishing revenues as a result of the Charleston Bump Hotspot May closure after considering likely redistribution of effort is estimated to be $8,300 per vessel per year. Alternative B4a would result in moderate short- and long-term adverse economic impacts as a result of restricting pelagic longline vessels from fishing in the Charleston Bump Hotspot May area, thus causing decreased revenues and increased costs associated with fishing in potentially more distant waters if vessel operators redistribute their effort.

Alternative B4b

This alternative would prohibit the use of pelagic longline gear in the vicinity of the "Hatteras Shelf" area of the Cape Hatteras Special Research Area during the month of May where elevated levels of dusky shark interactions have been reported. This alternative is expected to have moderate short and long-term direct adverse economic impacts on 42 vessels that have historically fished in this Hatteras Shelf Hotspot area during the month of May. The average annual revenue per vessel from 2008 through 2014 from all fishing sets made in this hotspot closure area has been approximately $9,980 during the month of May, assuming that fishing effort does not move to other areas. However, it is likely that some of the vessels that would be impacted by this hotspot closure would redistribute their effort to other fishing areas. The net impact of the Hatteras Shelf Hotspot May closure on fishing revenues after considering likely redistribution of effort is estimated to be $5,990 per vessel per year. Alternative B4b would result in moderate adverse economic impacts as a result of restricting pelagic longline vessels from fishing in the Hatteras Shelf Hotspot May area, thus causing decreased revenues and increased costs associated with fishing in potentially more distant waters if vessel operators redistribute their effort.

Alternative B4c

This alternative would prohibit the use of pelagic longline gear in the vicinity of the "Hatteras Shelf" area of the Cape Hatteras Special Research Area during the month of June where elevated levels of dusky shark interactions have been reported.

This alternative is expected to have moderate short and long-term direct adverse economic impacts on 37 vessels that have historically fished in this Hatteras Shelf Hotspot area during the month of June. The average annual revenue from 2008 through 2014 from all fishing sets made in this hotspot closure area has been approximately $7,640 per vessel during the month of June, assuming that fishing effort does not move to other areas. However, it is likely that some of the vessels that would be impacted by this hotspot closure would redistribute their effort to other fishing areas. The net impact of the Hatteras Shelf Hotspot June closure on fishing revenues after considering likely redistribution of effort is estimated to be $4,010 per vessel per year. Alternative B4c would result in moderate adverse economic impacts as a result of restricting pelagic longline vessels from fishing in the Hatteras Shelf Hotspot June area, thus causing decreased revenues and increased costs associated with fishing in potentially more distant waters if vessel operators redistribute their effort.

Alternative B4d

This alternative would prohibit the use of pelagic longline gear in the vicinity of the "Hatteras Shelf" area of the Cape Hatteras Special Research Area during the month of November where elevated levels of dusky shark interactions have been reported. This alternative is expected to have minor short and long-term direct adverse economic impacts on 23 vessels that have historically fished in this Hatteras Shelf Hotspot area during the month of November. The average annual revenue from 2008 through 2014 from all fishing sets made in this hotspot closure area has been approximately $5,230 per vessel during the month of November, assuming that fishing effort does not move to other areas. However, it is likely that some of the vessels that would be impacted by this hotspot closure would redistribute their effort to other fishing areas. The net impact of the Hatteras Shelf Hotspot November closure on fishing revenues after considering likely redistribution of effort is estimated to be $3,540 per vessel per year. Alternative B4d would result in minor adverse economic impacts as a result of restricting pelagic longline vessels from fishing in the Hatteras Shelf Hotspot November area, thus causing decreased revenues and increased costs associated with fishing in potentially more distant waters if vessel operators redistribute their effort.

Alternative B4e

This alternative would prohibit the use of pelagic longline gear by all U.S. flagged-vessels permitted to fish for HMS in the three distinct closures in the vicinity of the Mid-Atlantic Canyons during the month of October where elevated levels of dusky shark interactions have been reported. This alternative is expected to have moderate short and long-term direct adverse economic impacts on 64 vessels that have historically fished in this Canyons Hotspot October area. The average annual revenue from 2008 through 2014 from all fishing sets made in this hotspot closure area has been approximately $9,950 per vessel during the month of October, assuming that fishing effort does not move to other areas. However, it is likely that some of the vessels that would be impacted by this hotspot closure would redistribute their effort to other fishing areas. The net impact of the Canyons Hotspot October closure on fishing revenues after considering likely redistribution of effort is estimated to be $3,720 per vessel per year. Alternative B4e would result in moderate adverse economic impacts as a result of restricting

pelagic longline vessels from fishing in the Canyons Hotspot October area, thus causing decreased revenues and increased costs associated with fishing in potentially more distant waters if vessel operators redistribute their effort.

Alternative B4f

This alternative would prohibit the use of pelagic longline gear by all U.S. flagged-vessels permitted to fish for HMS in July in an area adjacent to the existing Northeastern U.S. closure which is currently effective for the month of June, where elevated levels of dusky shark interactions have been reported. This alternative is expected to have moderate short and long-term direct adverse economic impacts on 35 vessels that have historically fished in this Southern Georges Banks Hotspot area during the month of July. The average annual revenue from 2008 through 2014 from all fishing sets made in this hotspot closure area has been approximately $14,230 per vessel during the month of July, assuming that fishing effort does not move to other areas. However, it is likely that some of the vessels that would be impacted by this hotspot closure would redistribute their effort to other fishing areas. The net impact of the Southern Georges Banks Hotspot July closure on fishing revenues after considering likely redistribution of effort is estimated to be $8,290 per vessel per year. Alternative B4f would result in moderate adverse economic impacts as a result of restricting longline vessels from fishing in the Southern Georges Banks Hotspot July area, thus causing decreased revenues and increased costs associated with fishing in potentially more distant waters if vessel operators redistribute their effort.

Alternative B4g

This alternative would prohibit the use of pelagic longline gear by all U.S. flagged-vessels permitted to fish for HMS in August in an area adjacent to the existing Northeastern U.S. closure, which is currently effective for the month of June, where elevated levels of dusky shark interactions have been reported. This alternative is expected to have moderate short and long-term direct adverse economic impacts on 35 vessels that have historically fished in this Southern Georges Banks Hotspot area during the month of August. The average annual revenue from 2008 through 2014 from all fishing sets made in this hotspot closure area has been approximately $12,260 per vessel during the month of August, assuming that fishing effort does not move to other areas. However, it is likely that some of the vessels that would be impacted by this hotspot closure would redistribute their effort to other fishing areas. The net impact of the Southern Georges Banks Hotspot August closure on fishing revenues after considering likely redistribution of effort is estimated to be $5,990 per vessel per year. Alternative B4g would result in moderate adverse economic impacts as a result of restricting pelagic longline vessels from fishing in the Southern Georges Banks Hotspot August area, thus causing decreased revenues and increased costs associated with fishing in potentially more distant waters if vessel operators redistribute their effort.

Alternative B4h

This alternative would prohibit the use of pelagic longline gear by all U.S. flagged-vessels permitted to fish for HMS in a portion of the existing Charleston Bump time/area closure during

the month of November where elevated levels of dusky shark interactions have been reported. This alternative is expected to have minor short and long-term direct adverse economic impacts on 32 vessels that have historically fished in this Charleston Bump Hotspot area during the month of November. The average annual revenue from 2008 through 2014 from all fishing sets made in this hotspot closure area has been approximately $7,030 per vessel during the month of November, assuming that fishing effort does not move to other areas. However, it is likely that some of the vessels that would be impacted by this hotspot closure would redistribute their effort to other fishing areas. The net impact of the Charleston Bump Hotspot November closure on fishing revenues after considering likely redistribution of effort is estimated to be $2,720 per vessel per year. Alternative B4h would result in minor adverse social and economic impacts as a result of restricting pelagic longline vessels from fishing in the Charleston Bump Hotspot November area, thus causing decreased revenues and increased costs associated with fishing in potentially more distant waters if vessel operators redistribute their effort.

Alternative B4i

This alternative would provide strong incentives to avoid dusky sharks and to reduce interactions by modifying fishing behavior. Participants in the pelagic longline fleet have requested increased individual accountability within the fishery in light of several management issues facing the fishery (e.g., bluefin tuna, dusky sharks). NMFS first developed the use of conditional access under Draft Amendment 7, in part due to the public comments and feedback received regarding the original dusky hotspot closures proposed in Draft Amendment 5. This approach would address the fact that, according to HMS logbook data, relatively few vessels have consistently accounted for the majority of the dusky shark interactions. Conditional access would not impact the entire fleet for interactions made by a relatively small proportion of vessels. Therefore, depending on the metrics selected and fishery participant behavior, this alternative could have adverse socioeconomic effects on certain vessels that are both poor avoiders of dusky sharks and are non-compliant with the regulations. NMFS would analyze the socioeconomic impact by using similar fishing effort redistribution proposed in Draft Amendment7. Overall, the adverse socioeconomic effects of dusky shark hotspot closures are expected to be less if a conditional access alternative is implemented because some vessels would still be able to access and fish the hotspot closures. This alternative would have neutral to beneficial effects for vessels that are still authorized to fish in these regions, as they would not be held accountable for the behavior of other individuals and would not have to change their current fishing operations.

Alternative B4j

This alternative would implement bycatch caps on dusky shark interactions in hotspot areas. Under this alternative, NMFS would allow pelagic longline vessels limited access to high dusky shark interaction areas with an observer onboard while limiting the number of dusky shark interactions that could occur in these areas. Once the dusky shark bycatch cap for an area is reached, that area would close until the end of the three-year bycatch cap period. This alternative could lead to adverse economic impacts by reducing annual revenue from fishing in the various hot spot areas depending on the number of hotspots where bycatch cap limits are reached, the timing of those potential closures during the year, and the amount of effort redistribution that occurs after the closures. In addition to direct impacts to vessels owners, operators, and crew

members, this alternative would have moderate, adverse indirect impacts in the short and long-term on fish dealers, processors, bait/gear suppliers, and other shore-based businesses impacted by reduced fishing opportunities for pelagic longline vessel owners that would have fished in the hotspot area.

Alternative B5 - Preferred Alternative

Alternative B5, a preferred alternative, would provide additional training to pelagic longline, bottom longline, and shark gillnet vessel owners and operators as a new part of all Safe Handling and Release Workshops. The course would be taught in conjunction with the current Protected Species Safe Handling, Release, and Identification workshops that HMS pelagic longline, bottom longline, and shark gillnet vessel owners and operators are already required to attend. The training course would provide information regarding shark identification and regulations, as well as best practices to avoid interacting with dusky sharks and how to minimize mortality of dusky sharks caught as bycatch. This training course would provide targeted outreach on dusky shark identification and regulations, which should decrease interactions with dusky sharks. This alternative would have neutral economic impacts since the fishermen are already required to attend a workshop, incur some travel costs, and would not be fishing while taking attending the workshop. Given the neutral economic impacts and this alternative's potential to decrease dusky interactions and mortality, NMFS prefers this alternative.

Alternative B6 - Preferred Alternative

The economic impacts associated with Alternative B6, which would increase dusky shark outreach and awareness through development of additional commercial fishery outreach materials and establish a communication and fishing set relocation protocol for HMS commercial fishermen following interactions with dusky sharks and increase outreach to the pelagic longline fleet, are anticipated to be neutral. These requirements would not cause a substantial change to current fishing operations, but have the potential to help fishermen become more adept in avoiding dusky sharks. If fishermen become better at avoiding dusky sharks, there is the possibility that target catch could increase. On the other hand, the requirement to move the subsequent fishing set one nautical mile from where a previous dusky shark interaction occurred could move fishermen away from areas where they would prefer to fish and it could increase fuel usage and fuel costs. Given the low economic impacts of this alternative and its potential to decrease dusky shark interactions, NMFS prefers this alternative.

Alternative B7

NMFS would seek, through collaboration with the affected states and the ASMFC, to extend the end date of the existing state shark closure from July 15 to July 31. Currently, the states of Virginia, Maryland, Delaware, and New Jersey have a state-water commercial shark closure from May 15 to July 15. In 2014, 621 lb dw of aggregated LCS and 669 lb dw of hammerhead sharks were landed by commercial fishermen in Virginia, Maryland, and New Jersey from July 15 to July 31. Based on 2014 ex-vessel prices, the annual gross revenues loss for aggregated LCS and hammerhead shark meat to the regional fleet in revenues due to an extended closure date would be $847, while the shark fins would be $207. Thus the total loss annual gross

revenue for aggregated LCS and hammerhead sharks would be $1,054. Extending this closure by 16 days could cause a reduction of commercial fishing opportunity, likely resulting in minor adverse economic impacts due to reduced opportunities to harvest aggregated LCS and hammerhead sharks. In the long-term, this reduction would be neutral since fishermen would be able to adapt to the new opening date.

Alternative B8

Under Alternative B8, NMFS would remove pelagic longline gear as an authorized gear for Atlantic HMS. All commercial fishing with pelagic longline gear for HMS in the Atlantic, Gulf of Mexico, and Caribbean would be prohibited. This would greatly reduce fishing opportunities for pelagic longline fishing vessel owners. Prohibiting the use of pelagic longline fishing gear would result in direct and indirect, major adverse economic impacts in the short and long-term for pelagic longline vessel owners, operators, and crew.

Between 2008 and 2014, 168 different vessels reported using pelagic longline fishing gear in Atlantic HMS Logbooks. Average annual revenues were estimated to be approximately $34,322,983 per year based on HMS logbook records, bluefin tuna dealer reports, and the eDealer database. In 2014, there were 110 active pelagic longline vessels which produced approximately $33,293,118 in revenues. The 2014 landings value is in line with the 2008 to 2014 average. Therefore, NMFS expects future revenues forgone revenue on a per vessel basis to be approximately $309,000 per year based on 110 vessels generating an estimated $34 million in revenues per year. This displacement of fishery revenues would likely cause business closures for a majority of these pelagic longline vessel owners. Given the magnitude of the economic impact of this alternative, it is not a preferred alternative.

Alternative B9 - Preferred Alternative

Under Alternative B9, NMFS would require the use of circle hooks by all HMS directed shark permit holders in the bottom longline fishery. This requirement would likely reduce the mortality associated with catch a dusky shark in the bottom longline fishery.

There is negligible cost associated with switch from J-hooks to circle hooks. However, there is some indication that the use of circle hooks may reduce catch per unit effort (CPUE) resulting in lower catch of target species. To the extent that CPUE is reduced, some commercial fishermen using BLL gear may experience reduced landings and associated revenue with the use of circle hooks. This alternative would require the 224 vessels that hold a shark directed limited access permit as of 2015 to use circle hooks. However, 104 of the 224 vessels have an Atlantic tunas longline permit, which requires fishermen to use circle hooks with pelagic longline gear. Thus, those vessels would already possess and use circle hooks. The remaining 120 permit holders would be required to use circle hooks when using bottom longline gear. Given the low switching costs from J-hooks to circle hooks and the potential to reduce dusky shark mortality, NMFS prefers this alternative.

Alternative B10

Under this alternative, NMFS would annually allocate a certain number of allowable dusky shark interactions to each individual shark directed or incidental limited access permit holder in the HMS pelagic and bottom longline fisheries. These allocations would be transferable between permit holders. When each vessel's individual dusky shark bycatch quota (IDQ) is reached, the vessel would no longer be authorized to fish for HMS for the remainder of the year. The concept of this alternative is similar to the Individual Bluefin Tuna Quota (IBQ) Program implemented in Amendment 7 to the 2006 Consolidated HMS FMP (79 FR 71510), which established individual quotas for bluefin tuna bycatch in the pelagic longline fishery and authorized retention and sale of such bycatch. We would not, however, anticipate authorizing retention and sale of dusky sharks, since they remain a prohibited species.

The goal of this alternative would be to provide strong individual incentives to reduce dusky shark interactions while providing flexibility for vessels to continue to operate in the fishery, however, several unique issues associated with dusky sharks would make these goals difficult to achieve.

In order to achieve the mortality reductions based upon the 2016 SEDAR 21 dusky shark assessment update, the number of dusky shark interactions may need to be substantially reduced. NMFS expects the allocations to each vessel may be extremely low and highly inaccurate/uncertain. It is not clear that an IDQ system without an appropriate scientific basis would actually reduce interactions with dusky sharks. To the extent that any reduction actually occurred, some vessels would be constrained by the amount of individual quota they are allocated and this could reduce their annual revenue. If a pelagic longline vessel interacts with dusky sharks early in the year and uses their full IDQ allocation, they may be unable to continue fishing with pelagic longline or bottom longline gear for the rest of the year if they are unable to lease quota from other IDQ holders. This would result in reduced revenues and potential cash flow issues for these small businesses.

If vessel owners are only allocated a very low amount of IDQs, it is very unlikely that an active trading market for IDQs will emerge. The initial allocations could be insufficient for many vessels to maintain their current levels of fishing activity and they may not be able to find IDQs to lease or have insufficient capital to lease a sufficient amount of IDQs. Some vessel owners may view the risk of exceeding their IDQ allocations and the associated costs of acquiring additional quota to outweigh the potential profit from fishing, so they may opt to not continue participating in the fishery.

The annual transaction costs associated with matching lessor and lessees, the costs associated with drafting agreements, and the uncertainty vessel owners would face regarding quota availability would reduce some of the economic benefits associated with leasing quota and fishing.

There would also be increased costs associated with bottom longline vessels obtaining and installing EM and VMS units. Some bottom longline vessel owners might have to consider obtaining new vessels if their current vessels cannot be equipped with EM and VMS. There

would be increased costs associated with VMS reporting of dusky interactions. Some fishermen would also need to ship EM hard drives after each trip and they may need to consider acquiring extra hard drives to avoid not having one available when they want to go on a subsequent trip.

Given the challenges in properly identifying dusky sharks, every shark would need to be brought on board the vessel and ensure an accurate picture of identifying features was taken by the EM cameras. Such handling would likely increase dusky shark and other shark species mortality and thus not fully achieve the stated objectives of this rule. This alternative is also unlikely to minimize the economic impact of this rule as compared to the preferred alternatives given the potential for reduced fishing revenues, monitoring equipment costs, and transaction costs.

8.0 Community Profiles

8.1 Introduction

The Magnuson-Stevens Act requires, among other things, that all FMPs include a fishery impact statement intended to assess, specify, and describe the likely effects of the measures on fishermen and fishing communities (§303(a)(9)).

NEPA requires federal agencies to consider the interactions of natural and human environments by using a "systematic, interdisciplinary approach which will ensure the integrated use of the natural and social sciences...in planning and decision-making" (§102(2)(A)). Moreover, agencies need to address the aesthetic, historic, cultural, economic, social, or health effects, which may be direct, indirect, or cumulative. Consideration of social impacts is a growing concern as fisheries experience increased participation and/or declines in stocks. The consequences of management actions need to be examined to better ascertain and, to the fullest extent possible, mitigate regulatory impacts on affected constituents.

Social impacts are generally the consequences to human populations resulting from some type of public or private action. Those consequences may include alterations to the ways in which people live, work or play, relate to one another, and organize to meet their needs. In addition, cultural impacts, which may involve changes in values and beliefs that affect people's way of identifying themselves within their occupation, communities, and society in general are included under this interpretation. Social impact analyses help determine the consequences of policy action in advance by comparing the status quo with the projected impacts. Community profiles are an initial step in the social impact assessment process. Although public hearings and scoping meetings provide input from those concerned with a particular action, they do not constitute a full overview of the fishery.

The Magnuson-Stevens Act outlines a set of National Standards that apply to all fishery management plans and the implementation of regulations. Specifically, National Standard 8 notes that:

> "Conservation and management measures shall, consistent with the conservation requirements of this Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to: (1) provide for the sustained participation of such communities; and (2) to the extent practicable, minimize adverse economic impacts on such communities" (§301(a)(8)). See also 50 CFR §600.345 for National Standard 8 Guidelines.

"Sustained participation" is defined to mean continued access to the fishery within the constraints of the condition of the resource (50 CFR §600.345(b)(4)). It should be clearly noted that National Standard 8 "does not constitute a basis for allocation of resources to a specific fishing community nor for providing preferential treatment based on residence in a fishing

community" (50 CFR §600.345(b)(2). The Magnuson-Stevens Act further defines a "fishing community" as:

> "a community that is substantially dependent upon or substantially engaged in the harvest or processing of fishery resources to meet social and economic needs, and includes fishing vessel owners, operators, crew, and fish processors that are based in such communities" (§301(16)).

Likewise, specific to development and amendment of HMS FMPs, the Magnuson-Stevens Act, paragraph 304(g)(1)(C), requires the Secretary to:

- Evaluate the likely effects, if any, of conservation and management measures on participants in the affected fisheries; and
- Minimize, to the extent practicable, any disadvantage to U.S. fishermen in relation to foreign competitors.

NMFS (2001) guidelines for social impact assessments specify that the following elements are utilized in the development of FMPs and FMP amendments:

1. The size and demographic characteristics of the fishery-related work force residing in the area; these determine demographic, income, and employment effects in relation to the work force as a whole, by community and region.

2. The cultural issues of attitudes, beliefs, and values of fishermen, fishery-related workers, other stakeholders, and their communities.

3. The effects of proposed actions on social structure and organization; that is, on the ability to provide necessary social support and services to families and communities.

4. The non-economic social aspects of the proposed action or policy; these include life-style issues, health and safety issues, and the non-consumptive and recreational use of living marine resources and their habitats.

5. The historical dependence on and participation in the fishery by fishermen and communities, reflected in the structure of fishing practices, income distribution and rights.

8.2 Methodology -- Previous community profiles and assessments

Background information on the legal requirements and summary information on the community studies conducted to choose the communities profiled in this document is not repeated here and can be found in previous HMS Stock Assessment and Fishery Evaluation (SAFE) Reports, and was most recently updated in Chapter 6 of the 2011 HMS SAFE Report (NMFS 2011). Additionally, the 2011 and 2012 HMS SAFE Reports contain modified demographic profile tables from previous documents to include the same baseline information for each community profiled, and use 1990, 2000, and 2010 Bureau of the Census data for comparative purposes. Chapter 6 of the 2011 SAFE Report is an update of the 2008 SAFE Report (NMFS 2008), and

included available 2010 U.S. Census information. The 2008 SAFE Report consolidated all of the communities profiled in previous HMS FMPs or FMP amendments and updated the community information where possible. Of the communities profiled, ten (Gloucester and New Bedford, Massachusetts; Barnegat Light and Brielle, New Jersey; Hatteras Village and Wanchese, North Carolina; Islamorada and Madeira Beach, Florida; and Dulac and Venice, Louisiana) were originally selected due to the proportion of HMS landings in the community, the relationship between the geographic communities and the fishing fleets, the existence of other community studies, and input from the HMS and Billfish Advisory Panels (since consolidated in 2006 into one HMS Advisory Panel). The remaining 14 communities (Wakefield, Rhode Island; Montauk, New York; Cape May, New Jersey; Ocean City, Maryland; Atlantic Beach, Beaufort, and Morehead City, North Carolina; Apalachicola, Destin, and Port Salerno, Florida; Orange Beach, Alabama; Grand Isle, Louisiana; and Freeport and Port Aransas, Texas), although not selected initially, have been identified as communities that could be impacted by changes to the current HMS regulations because of the number of HMS permits associated with these communities, and their community profile information has been incorporated into the document. The descriptive community profiles are organized by state and include information provided by Wilson, *et al.* (1998), Kirkley (2005), Impact Assessment, Inc. (2004), and recent information obtained from MRAG Americas, Inc. (2008).

This section presents social indicators of vulnerability and resilience developed by Jepson and Colburn (2013) for 25 communities selected for having a greater than average number of HMS permits associated with them. Jepson and Colburn (2013) developed a series of indices using social indicator variables that could assess a coastal community's vulnerability or resilience to potential economic disruptions such as those resulting from drastic changes in fisheries quotas and seasons, or natural and anthropogenic disasters. Indices and index scores were developed using factor analyses of data from the United States Census, permit sales, landings reports, and recreational fishing effort estimates from the MRIP survey (Jepson and Colburn, 2013). This section uses radar graphs to present four indices related to fishing dependence vulnerability (recreational and commercial fishing reliance and engagement indices, Figure 8.1and Figure 8.2), two indices related to social vulnerability (personal disruption index and poverty index, Figure 8.3), and two related to gentrification vulnerability (retiree migration index and natural amenities index, Figure 8.4). Each index is scored so that higher values indicate increased community vulnerability to disruption with mean index scores standardized to zero. Communities with index scores greater than one standard deviation above the mean are considered to be the most vulnerable, and this threshold is illustrated on each figure with a black circular line (Jepson and Colburn, 2013).

Fishing Reliance and Engagement Indices

Jepson and Colburn (2013) developed two indices each to measure community reliance and engagement with recreational and commercial fishing, respectively. The recreational fishing engagement index was measured using MRIP estimates of the number of charter, private boat, and shore recreational fishing trips originating in each community. The recreational fishing reliance index was generated using the same fishing trip estimates adjusted to a per capita basis. In Figure 8.1, recreational fishing reliance and engagement index scores are presented for 25 HMS communities. The communities of Orange Beach, AL; Apalachicola, FL; Destin, FL; Grand Isle, LA; Venice, LA; Ocean City, MD; Atlantic Beach, NC; Barnegat Light, NJ; Cape

May, NJ; and Montauk, NY all exceed the one standard deviation threshold for both recreational reliance and engagement indicating that each exhibits exceptionally high numbers of annual fishing trips both in absolute numbers and adjusted per capita. This suggests that each of these communities are highly vulnerable to economic disruption from potential declines in fishing participation be they due to seasonal fishing closures or disasters such as Super Storm Sandy or the Deepwater Horizon oil spill. Other communities such as Panama City, FL; Islamorada, FL; Pompano Beach, FL; Dulac, LA; Gloucester, MA; New Bedford, MA; Beaufort, NC; Morehead City, NC; Brielle, NJ; and Wakefield-Peacedale, RI all had scores in excess of the one standard deviation threshold on the recreational fishing engagement index, but not on the recreational fishing reliance index. This indicates these communities exhibit large absolute numbers of fishing trips annually, but only moderate numbers of trips on a per capita basis. This would indicate these communities are also economically vulnerable to declines in recreational fishing participation, but not as severely as other HMS communities.

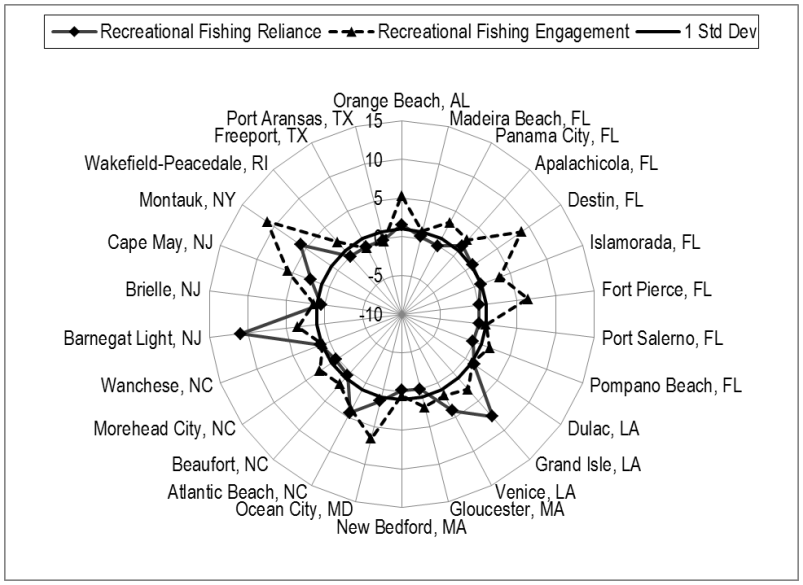

Figure 8.1 Recreational Fishing Engagement and Reliance Indices by HMS Community.

Jepson and Colburn (2013) also calculated indices measuring community reliance on and engagement with commercial fishing. Commercial fishing engagement was assessed based on pounds of landings, value of landings, number of commercial fishing permits sold, and number of dealers with landings. Commercial fishing reliance was assessed based on value of landings per capita; number of commercial permits per capita; dealers with landings per capita; and percentage of people employed in agriculture, forestry, and fishing. Figure 8.2 shows that Dulac, LA; Grand Isle, LA; Venice, LA; Gloucester, MA; New Bedford, MA; Beaufort, NC; Wanchese, NC; Barnegat, NJ; Cape May, NJ; and Montauk, NY all score above the one standard deviation threshold for both indices indicating they are all dependent upon commercial fishing. Several communities including Gloucester, MA; New Bedford, MA; Barnegat Light, NJ; and Cape May, NJ exhibited particularly high index scores on one of the two indices suggesting they are particularly dependent on commercial fishing.

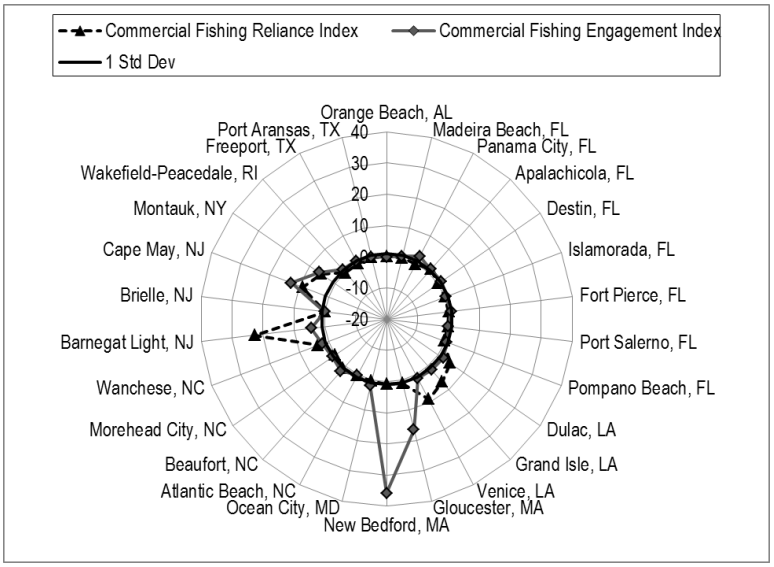

Figure 8.2 Commercial Fishing Engagement and Reliance Indices by HMS Community.

Social Vulnerability Indices

Two indices of social vulnerability developed by Jepson and Colburn (2013) are presented in this section. The personal disruption index includes the following community variables representing disruptive forces in family lives: percent unemployment, crime index, percent with no diploma, percent in poverty, and percent separated females. The poverty index includes several variables measuring poverty levels within different community social groups including: percent receiving government assistance, percent of families below the poverty line, percent over 65 in poverty, and percent under 18 in poverty. Figure 8.3 shows that the communities of Apalachicola, FL; Fort Pierce, FL; and New Bedford, MA each score above the one standard deviation threshold on both of the social vulnerability indices, while the communities of Dulac, LA; Venice, LA; and Freeport, TX each score above the threshold on one index. These scores suggest these communities would likely experience greater difficulty recovering from economic hardships caused by job losses in the recreational and commercial fishing sectors.

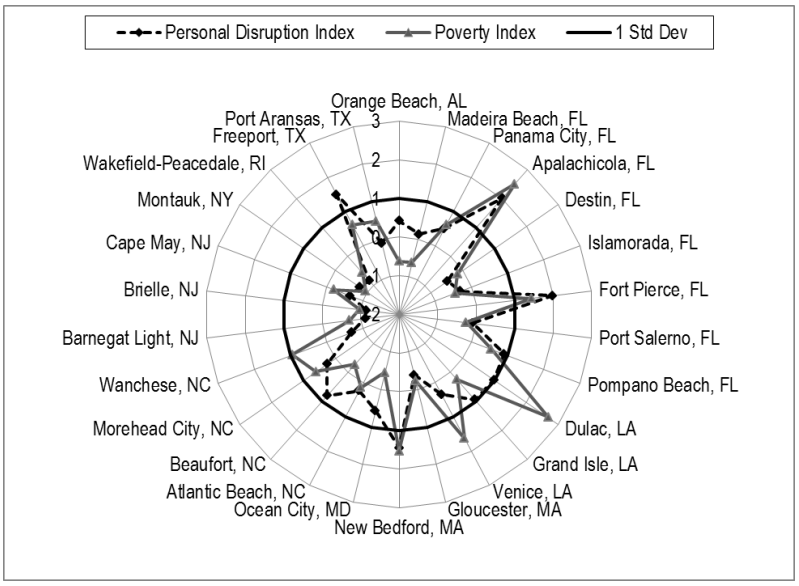

Figure 8.3 Social Vulnerability Indices by HMS Community.

Gentrification Indices of Vulnerability

Finally, this section includes two indices measuring community vulnerability to gentrification developed by Jepson and Colburn (2013). Gentrification is a process whereby community structure changes as a result of an influx in higher income households, and the businesses that cater to them, to the point community social networks and power structures change, and traditional community families are threatened to be displaced (Jepson and Colburn, 2013). The retiree migration index includes variables that measure the influx of retirees to a community and includes: households with one or more over 65, percent population receiving social security, percent receiving retirement income, and percent in labor force. The natural amenities index includes variables that represent community characteristics that can determine the areas attractiveness to emigrants which include: rental vacancy rate, percent homes vacant, boat launches per capita, and percent water cover.

Figure 8.4 shows that the communities of Ocean City, MD; Barnegat Light, NJ; and Brielle, NJ all possess index scores in excess of the one standard deviation threshold for both indices indicating that these communities are likely seeing signs of gentrification. Additionally, the communities of Orange Beach, AL; Grand Isle, LA; Atlantic Beach, NC; Montauk, NY; and Port Aransas, TX each exceed the threshold for the natural amenities index, and are approaching the threshold for the retiree migration index suggesting the these communities are vulnerable to or in the early stages of gentrification.

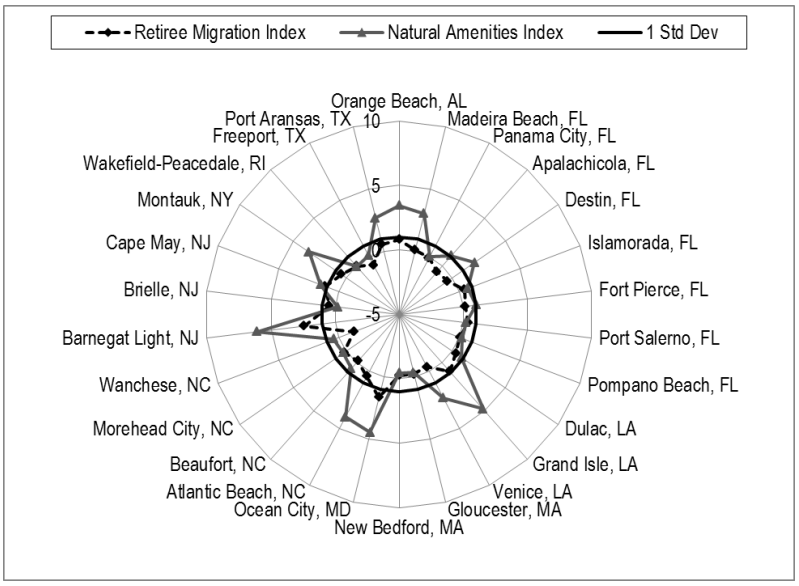

Figure 8.4 Gentrification Vulnerability Indices by HMS Community.

Community Impacts from 2010 Deepwater Horizon/BP Oil Spill

On April 20, 2010, an explosion and subsequent fire damaged the Deepwater Horizon MC252 oil rig, which capsized and sank approximately 50 miles southeast of Venice, Louisiana. Oil flowed for 86 days into the Gulf of Mexico from a damaged well head on the sea floor. In response to the Deepwater Horizon MC252 oil spill, NMFS issued a series of emergency rules (75 FR 24822, May 6, 2010; 75 FR 26679, May 12, 2010; 75 FR 27217, May 14, 2010) closing a portion of the Gulf of Mexico exclusive economic zone (EEZ) to all fishing and analyzed the environmental impacts of these closures in an Environmental Assessment. Between May and November 2010, NMFS closed additional portions of the Gulf of Mexico to fishing. The maximum closure was implemented on June 2, 2010, when fishing was prohibited in approximately 37 percent of the Gulf of Mexico EEZ. Significant portions of state territorial waters in Alabama (40 percent), Florida (2 percent), Louisiana (55 percent), and Mississippi (95 percent) were closed to fishing (Upton, 2011). After November 15, 2010, approximately 0.4 percent (1,041 square miles) of the federal fishing area was kept closed immediately around the Deepwater Horizon wellhead through April 19, 2011, when the final oil spill closure area was lifted (NOAA 2011).

Socioeconomic impacts from the oil spill on HMS communities include losses in HMS revenue and negative psychological impacts. One study (Sumaila et al, 2012) estimated loss in commercial pelagic fish revenue, which includes HMS species, at $35-58 million over the next seven years. The study also estimated that Gulf of Mexico recreational fisheries could lose between 11,000-18,000 jobs, and have an overall economic loss between $2.5-4.2 billion (Sumaila et al, 2012).

On April 20, 2011, BP agreed to provide up to $1 billion toward Early Restoration projects in the Gulf of Mexico (*Deepwater Horizon* Oil Spill Final Phase IV Early Restoration Plan and Environmental Assessments, 2015). The agreement intends to expedite the start of restoration in the Gulf in advance of the completion of the injury assessment process.

One of the restoration projects is the PLL Bycatch Reduction Project, which was released in September 2015 and will restore pelagic fish that were affected by the spill. The project aims to reduce the number of fish (including marlin, sharks, bluefin tuna, and smaller individuals of the target species) incidentally caught and killed in PLL fishing gear by compensating PLL fishermen who agree to voluntarily refrain from PLL fishing in the Gulf during an annual six-month "repose" period that coincides with the bluefin tuna spawning season. The project will also provide participating fishermen with two alternative gear types (green-stick gear and/or buoy gear) to allow for the continued harvest of yellowfin tuna and swordfish during the repose period when PLL gear is not used.

Demographic data for coastal counties was evaluated, taking into consideration communities that could be disproportionately affected by this action. It found that while there are dispersed low income, minority Vietnamese-American populations in Louisiana that actively participate in the Gulf of Mexico PLL fishery and commute to fishing ports, the PLL project would not disproportionately affect minority or low income populations. The project is voluntary in nature, and as such, any fishermen in the Gulf of Mexico PLL fishery would choose whether to participate in the repose and alternative gear provisioning. During the repose project, fish dealers, fuel suppliers, and ice/bait/equipment suppliers may experience negative economic effects; however, these effects are anticipated to be minor and short term due to the limited duration of the repose period. Furthermore, negative economic effects may be partially mitigated by the use of alternative fishing gear. For more information see: http://www.gulfspillrestoration.noaa.gov/wp-content/uploads/Final-Phase-IV-ERP-EA.pdf http://www.noaa.gov/deepwaterhorizon/index.html and http://sero.nmfs.noaa.gov/deepwater_horizon/index.html.

In addition, please refer to the Description of the Affected Environment in Chapter 3.0, the Economic Evaluation in Chapter 4.0, the RIR in Chapter 6.0, the IRFA in Chapter 7.0, and the Environmental Justice analysis in Chapter 9.0 of this document for additional information. Furthermore, each of the management alternatives in Chapter 4.0 includes an assessment of the potential social and economic impacts associated with the alternatives. The preferred alternatives were selected to minimize economic impacts and provide for the sustained participation of fishing communities, while taking the necessary actions to end overfishing and rebuild overfished fisheries as required by the Magnuson-Stevens Act. Please see Chapter 4.0 for additional information on how preferred alternatives were selected to minimize social and economic impacts.

8.3 Overview of the HMS Recreational Fishery

To recreationally fish for sharks in federal waters, a vessel must either have an HMS Angling or HMS Charter/Headboat permit. According to the 2015 SAFE Report, 20,193 HMS Angling permits were issued as of October 2015, and the top four home ports by state for these permit holders were Florida (19 percent), New Jersey (13 percent), Massachusetts (12 percent), and New York (9 percent). According to the 2015 SAFE Report, as of October 2015, 3,596 HMS Charter/Headboat permits were issued in 2015, and the top four home ports by state for these permit holders were Massachusetts (20 percent), Florida (15 percent), New Jersey (13 percent), and North Carolina (9 percent).

8.4 Overview of the Pelagic Longline Fishery

The Atlantic HMS pelagic longline (PLL) fishery of the Atlantic and Gulf of Mexico extends from Maine to Texas, and includes Puerto Rico and the U.S. Virgin Islands. In order to fish with PLL gear, vessels must possess an Atlantic tunas Longline limited access permit, along with Shark (Directed or Incidental) and Swordfish (Directed or Incidental) limited access permits. Therefore, the number of participants in the Atlantic HMS PLL fishery is determined from the number of Atlantic tunas Longline permits that are issued. According to the 2015 SAFE Report, the geographic extent of 280 Atlantic tunas Longline permit holders is large, but is concentrated in the waters off five states as of October 2015; Florida (44 percent), New Jersey (15 percent), Louisiana (13 percent), New York (7 percent), and North Carolina (6 percent). The U.S. PLL fishery for Atlantic HMS primarily targets swordfish, yellowfin tuna, and bigeye tuna in various areas and seasons, and is generally considered a multi-species fishery. For a more detailed description of the PLL fishery, please see Chapter 3.0.

Dealers that purchase swordfish and tunas, which are the main species targeted by the PLL fishery, are also found throughout the range of where the fishery operates. According to the 2015 SAFE Report, as of October 2015, the top four states with dealers who had both a bluefin tuna and BAYS tunas (bigeye, albacore, yellowfin, and skipjack tuna) dealer permits, which consisted of 289 dealers, were Massachusetts (27 percent), New York (16 percent), New Jersey (13 percent), and Rhode Island (9 percent). Over that same time period, the top four states where the 184 Atlantic swordfish dealer permits issued in 2015 were Florida (48 percent), Massachusetts (9 percent), North Carolina (9 percent), and New Jersey (5 percent).

8.5 Summary of Fisheries Impacts

The following provides a summary of impacts to participants in the recreational and PLL fisheries and fishing dependent communities, including measures taken to minimize adverse social and economic effects and to provide for the sustained participation in these fisheries. Based on the foregoing assessment and referenced sections of this EIS, NMFS has determined that the action as proposed would have the following impacts on participants in affected fisheries.

Summary of Impacts

Cumulative social and economic impacts to participants in the recreational fisheries and the commercial fisheries are expected to be minor adverse or neutral, as described in Chapter 4.0.

Minimization of Adverse Impacts

Mitigation of adverse impacts was considered when selecting the preferred alternatives. Please see Chapters 4.0 for additional information on how preferred alternatives were selected to minimize social and economic impacts.

Effects on Domestic Fishermen

Dusky sharks have been on the prohibited species list in the United States since 2000. Proposed management measures under Amendment 5b are not expected to have any additional impact on domestic fishermen in relation to foreign competitors.

Social Impact Assessment

This amendment conforms to the following guidelines for social impact assessments (as outlined above):

- NMFS describes the demographic characteristics of the fishery-related work force residing in communities affected by fishery management in Chapter 6 of the 2011 and 2012 SAFE Reports (NMFS 2011; NMFS 2012). In particular, the demographic, income, and employment effects in relation to the work force as a whole by community and region are discussed in Chapter 6 of the SAFE Reports.
- The preferred alternatives are expected to have minor adverse or neutral cumulative socioeconomic impacts and, therefore, should not change the cultural issues of attitudes, beliefs, and values of fishermen, fishery-related workers, other stakeholders, and their communities.
- The preferred alternatives should not affect the social structure and organization, such as the ability to provide necessary social support and services for families and communities.
- The preferred alternatives should not affect the non-economic social aspects of the affected communities, such as lifestyle issues, health and safety issues, and the non-consumptive and recreational use of living marine resources and their habitats.
- The preferred alternatives should not affect the historical dependence on and participation in the commercial and recreational and PLL fisheries by fishermen and communities, reflected in the structure of fishing practices, income distribution, and rights.

8.6 References

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9.0 Applicable Law

9.1 Magnuson-Stevens Fishery Conservation and Management Act

The analyses in this document are consistent with the National Standard (NS) guidelines set forth in the 50 CFR part 600 regulations. The following descriptions are a summary of how the preferred alternatives are consistent. More information can be found in earlier chapters.

9.1.1 Consistency with the National Standards

National Standard 1 requires NMFS to prevent overfishing while achieving, on a continuing basis, optimum yield from each fishery. As summarized in other chapters, over the past several years, NMFS has undertaken numerous management actions, including the 2006 Consolidated HMS FMP (NMFS 2006), Amendment 2 to the 2006 Consolidated HMS FMP (NMFS 2008), Amendment 3 to the 2006 Consolidated HMS FMP (NMFS 2010), and Amendment 6 to the 2006 Consolidated HMS FMP (NMFS 2015), to address overfishing and to rebuild shark stocks. The preferred alternatives in this document are consistent, to the extent practicable, with ongoing management efforts to rebuild, manage, and conserve target species in accordance with the NS1 guidelines. Additionally, the clarification of ACLs and AMs for the prohibited shark complex (ACL =0) described in Chapter 1.0 is consistent with NS1 guidelines.

- The preferred alternatives to implement new requirements in the recreational shark fisheries, Alternatives A2 and A6a, were specifically designed to stop overfishing of dusky sharks and to rebuild the dusky shark stock, while still facilitating recreational fishermen's access to other shark resources. These alternatives are consistent with NS1 because they would reduce dusky shark mortality, consistent with the 2016 SEDAR 21 stock assessment update for dusky sharks while allowing fishermen to harvest optimum yield of other shark species. Alternative A2 would require recreational shark fishermen to obtain a shark endorsement and take an online training course and quiz to learn about shark identification, regulations, and safe handling. These requirements would provide NMFS with a list of shark fishermen for outreach and protect dusky sharks by reducing landings due to misidentification. The requirement would not limit fishermen's ability to participate in the recreational shark fishery. Alternative A6a would require all HMS permit holders fishing recreationally for sharks to use circle hooks. The use of circle hooks can reduce fishing mortality of dusky sharks and other shark species by reducing instances of gut-hooked fish, thus, increasing the post-release survival. The use of circle hooks would provide some protection for dusky sharks while still allowing access to recreational shark fishing.

- The preferred alternatives that address commercial fisheries, Alternatives B3, B5, B6, and B9 were similarly designed to stop overfishing of dusky sharks and to rebuild the dusky shark stock, while still facilitating commercial fishermen's access to the species. Alternative B3 would require Atlantic shark commercial permit holders (directed or incidental) fishing with pelagic longline gear to release all sharks that are not being boarded or retained by using a dehooker, or by cutting the gangion no more than three feet

from the hook. This measure would reduce fishing mortality of dusky sharks by decreasing post-release mortality without limiting the ability of pelagic longline fishermen to catch and retain target species. Alternative B5 would provide specific training to HMS pelagic longline, bottom longline, and gillnet fishermen on how to identify, safely handle, and release dusky sharks, which would reduce dusky shark fishing mortality. Alternative B6 would require that all vessels with an Atlantic shark commercial permit and fishing with pelagic longline, bottom longline, and shark gillnet gear abide by a dusky shark fleet communication and relocation protocol. The protocol would require vessels to report the location of dusky shark interactions over the radio to other vessels in the area and that subsequent fishing sets on that fishing trip could be no closer than 1 nautical mile (nm) from where the encounter took place. Although this alternative could result in lost fishing opportunities in the immediate area, fishermen would be able to continue fishing in other areas. Alternative B9 would require HMS shark directed permit holders to use circle hooks when deploying bottom longline gear. The use of circle hooks would reduce fishing mortality of dusky sharks and other shark species by reducing instances of gut-hooked fish, thus, increasing the post-release survival. The use of circle hooks would provide some protection for dusky sharks while still allowing fishermen using bottom longline to target sharks.

NS 2 requires that conservation and management measures be based on the best scientific information available. The preferred alternatives in this document are consistent with NS 2.

- The preferred recreational and commercial alternatives would be consistent with NS2 because they are based on the latest (2016) SEDAR 21 stock assessment update for dusky sharks. Furthermore, the development and impact analyses for the preferred alternatives drew heavily from several up to date data sources including logbooks, observer reports, fishery-independent surveys, MRIP estimates, and recent scientific research results. Results from the stock assessment and the other data sources represent the best available science.

NS 3 requires that, to the extent practicable, an individual stock of fish be managed as a unit throughout its range and interrelated stocks of fish be managed as a unit or in close coordination. The preferred alternatives in this document are consistent with NS 3.

- The preferred alternatives applicable to the recreational and commercial fisheries apply to dusky sharks across its range, as identified by the stock assessment. SEDAR 21 found that there is one stock of dusky sharks that spans the Atlantic Ocean, including the Gulf of Mexico and Caribbean Sea. All of the preferred alternatives apply across the entire U.S. distribution of dusky sharks and are not geographically limited in any way, consistent with NS 3.

NS 4 requires that conservation and management measures do not discriminate between residents of different states. Furthermore, if it becomes necessary to allocate or assign fishing privileges among various U.S. fishermen, such allocation should be fair and equitable to all fishermen; be reasonably calculated to promote conservation; and should be carried out in such a manner that

no particular individual, corporation, or other entity acquires an excessive share of such privileges. The preferred alternatives in this document are consistent with NS 4.

- None of the preferred alternatives are limited geographically and instead are applicable across the entire U.S. Atlantic. Thus, the conservation and management measures do not discriminate between residents of different states, consistent with NS 4.
- The preferred alternatives do not allocate or assign fishing privileges.

NS 5 requires that conservation and management measures should, where practicable, consider efficiency in the utilization of fishery resources with the exception that no such measure shall have economic allocation as its sole purpose. The preferred alternatives in this document are consistent with NS 5.

- Consistent with NS 5, the conservation and management measures in the preferred alternatives were analyzed for changes in the efficiency of utilization of the fishery resource. The primary driver of these measures is to reduce mortality on dusky sharks per the SEDAR 21 stock assessment. Because the goal is to reduce fishing mortality, there would be some loss in efficiency in both the recreational and commercial fisheries; however, the preferred alternatives have been designed to minimize such losses. Preferred alternatives A2, B3, and B5 would not reduce efficiency in the utilization of the resource since these measures focus on permitting, safe handling, and education. Alternatives A6a and B9 would require the use of circle hooks when fishing for sharks. The use of circle hooks may result in lower catch of target species, however, the effect is expected to be minimal. Alternative B6 would require that all vessels with an Atlantic shark commercial permit and fishing with pelagic longline, bottom longline, and shark gillnet gear abide by a dusky shark fleet communication and relocation protocol. The protocol would require vessels to report the location of dusky shark interactions over the radio to other vessels in the area and that subsequent fishing sets on that fishing trip could be no closer than 1 nautical mile (nm) from where the encounter took place. Although this alternative could result in lost fishing opportunities in the immediate area, fishermen would be able to continue fishing in other areas.

NS 6 states that conservation and management measures shall take into account and allow for variations among, and contingencies in, fisheries, fishery resources, and catches. The preferred alternatives in this document are consistent with NS 6.

- Each of the preferred alternatives would implement measures that consider the variations among, and contingencies in, fisheries, fishery resources, and catches. The preferred alternatives relate to permitting, gear type, safe handling, and education. Alternative A2, in particular, would require recreational shark fishermen to obtain a shark endorsement and take a short online quiz to learn about shark identification. This alternative specifically considers variations in target species among recreational HMS anglers and allows NMFS to better address needs within the recreational shark fishery. Alternative B6 would require that all vessels with an Atlantic shark commercial permit and fishing with pelagic longline, bottom longline, and shark gillnet gear abide by a dusky shark fleet communication and relocation protocol. The protocol would require vessels to report the location of dusky

shark interactions over the radio to other vessels in the area and that subsequent fishing sets on that fishing trip could be no closer than 1 nautical mile (nm) from where the encounter took place. Alternative B6 is specifically designed to protect dusky sharks in a dynamic environment while considering variations among, and contingencies in, fisheries, fishery resources, and catches.

NS 7 states that conservation and management measures shall, where practicable, minimize costs and avoid unnecessary duplication. The preferred alternatives in this document are consistent with NS 7.

- The costs associated the preferred alternatives are minimal as they would implement permitting, gear type, safe handling, and education requirements. Consistent with NS 7, the preferred alternatives were analyzed to avoid duplication.

NS 8 states that conservation and management measures shall, consistent with the conservation requirements of the Magnuson-Stevens Act (including the prevention of overfishing and rebuilding of overfished stocks), take into account the importance of fishery resources to fishing communities in order to provide for the sustained participation of such communities, and to the extent practicable, minimize adverse economic impacts on such communities. The preferred alternatives in this document are consistent with NS 8.

- The preferred alternatives are necessary to rebuild and end overfishing of dusky sharks, consistent with NS 1. There are some minor adverse social and economic impacts associated with the preferred measures in the recreational and commercial fisheries. In the recreational fishery, the minor adverse impacts are mostly associated with a possible decrease in target catch when using circle hooks. However, this measure would reduce fishing mortality as prescribed by the SEDAR 21 stock assessment. NMFS considered a range of alternatives with varying environmental, economic, and social impacts but only certain alternatives would accomplish the goals necessary to rebuild overfished shark species and prevent overfishing. The preferred alternatives would strike an appropriate balance between positive ecological impacts that are necessary to rebuild and prevent overfishing on depleted stocks while minimizing, to the extent practicable, the severity of negative social and economic impacts that would occur as a result.

- In the commercial HMS fisheries, Alternative B5, a preferred alternative, would provide training and information regarding shark identification and regulations, as well as best practices to avoid interacting with dusky sharks and how to minimize mortality of dusky sharks caught as bycatch. This alternative would have minor adverse socioeconomic impacts since the fishermen would be required to attend a workshop, incur some travel costs, and would not be fishing while taking attending the workshop. Although some adverse socioeconomic impacts are expected, the training would be a part of an existing workshop that owners and operators are already required to attend.

NS 9 states that conservation and management measures shall, to the extent practicable, minimize bycatch, and to the extent that bycatch cannot be avoided, minimize the mortality of such bycatch. The preferred alternatives in this document are consistent with NS 9.

- Since dusky sharks are a prohibited species and targeting and retention are not allowed, NMFS considers them bycatch. All of the preferred alternatives are specifically designed to reduce bycatch of dusky sharks, and where bycatch is unavoidable, minimize bycatch mortality of the species, consistent with NS 9.

NS 10 states that conservation and management measures shall, to the extent practicable, promote the safety of human life at sea. The preferred alternatives in the document are consistent with NS 10.

- No impact to safety of life at sea is anticipated to result from these preferred alternatives. The preferred alternatives would not require fishermen to travel greater distances, fish in bad weather, or otherwise fish in an unsafe manner.

9.1.2 Consideration of Section 304(g) measures

Section 304(g) of the Magnuson-Stevens Act sets forth requirements specific to the preparation and implementation of an FMP or FMP amendment for HMS. See 16 U.S.C. 1854(g) for full text. The summary of the requirements of Section 304(g) and an explanation of how NMFS is consistent with these requirements are below. The impacts of the preferred alternatives and how it meets these requirements are described in more detail in Chapters 2.0 and 4.0 of the document.

1. *Consult with and consider the views of affected Councils, Commissioners, and advisory groups*

On October 7, 2011, the NMFS published a notice announcing our intent to prepare an Amendment 5 to the 2006 Consolidated HMS FMP with an Environmental Impact Statement in accordance with the requirements of the National Environmental Policy Act (76 FR 62331). NMFS also made the stock status determinations based on the results of the SEDAR 21 process in the October 7, 2011, notice of intent. Determinations in the October 2011 notice included that dusky sharks are still overfished and still experiencing overfishing (i.e., their stock status has not changed).

NMFS previously considered alternatives for management of dusky sharks in Draft Amendment 5 (77 FR 70552, November 26, 2012), which proposed measures that were designed to reduce fishing mortality and effort in order to rebuild various overfished Atlantic shark species, including dusky sharks, while ensuring that a limited sustainable shark fishery for certain species could be maintained consistent with legal obligations and the 2006 Consolidated HMS FMP. After reviewing all of the comments received, NMFS decided to conduct further analyses on measures pertaining to dusky sharks in a separate FMP amendment, EIS, and proposed rule. NMFS then finalized management measures for the other Atlantic shark species included in Draft Amendment 5 in the Amendment 5a final rule (78 FR 40318, July 3, 2013), while dusky shark management measures would be included in an upcoming, separate rulemaking known as Amendment 5b.

NMFS prepared a Predraft for Amendment 5b that considered the feedback received on those initial proposals in Draft Amendment 5 and solicit additional public input and consulted with the HMS Advisory Panel at the Spring 2014 meeting. The Predraft included alternatives that were not within the scope of the Draft Amendment 5 as well as new information.

On October 4, 2016, NMFS made the stock status determinations based on the results of the 2016 update to the SEDAR 21 dusky shark stock assessment. The 2016 update found that dusky sharks are still overfished and subject to overfishing. NMFS has developed Draft Amendment 5b in response to the results of the 2016 update to the SEDAR 21 dusky shark stock assessment and public comment received on Draft Amendment 5 to the 2006 Consolidated HMS FMP, and on the Amendment A5b Predraft.

Written comments received on the issues and options presentation during the scoping meetings on the Predraft and at HMS Advisory Panel meetings were considered at all stages when preparing this document. NMFS will send the document and its proposed rule to consulting parties including all five of the Atlantic Regional Fishery Management Councils, both the Atlantic and Gulf States Marine Fisheries Commissions, and the HMS AP. NMFS is also requesting time on the agenda to discuss this Amendment during the Council and Commission meetings that occur during the comment period. Furthermore, NMFS will again meet and consult with the HMS AP during the proposed rule comment period.

2. *Establish an advisory panel for each FMP*

As part of the 2006 Consolidated HMS FMP, NMFS combined the Atlantic Billfish and HMS APs into one panel. This combined HMS AP provides representation from the commercial and recreational fishing industry, academia, non-governmental organizations, state representatives, representatives from the Regional Fishery Management Councils, and the Atlantic and Gulf States Marine Fisheries Commissions. This amendment will not change the HMS AP, and NMFS convened a meeting of the HMS AP during the scoping period of Amendment 5b to discuss and collect comments on potential shark management. The HMS AP will again meet to discuss Amendment 5b during the proposed rule comment period.

3. *Evaluate the likely effects, if any, of conservation and management measures on participants in the affected fisheries and minimize, to the extent practicable, any disadvantage to U. S. fishermen in relation to foreign competitors*

Throughout this document, NMFS has described the effects of the management measures and any impacts on U.S. fishermen. The preferred alternatives in this document are necessary to meet Magnuson-Stevens Act mandates to rebuild the overfished dusky shark stock and prevent overfishing, which in the long-term are not expected to disadvantage U.S. fishermen in relation to foreign competitors.

4. *With respect to HMS for which the United States is authorized to harvest an allocation, quota, of fishing mortality level under a relevant international fishery agreement, provide fishing vessels with a reasonable opportunity to harvest such allocation, quota, or at such fishing mortality level*

There is currently no international agreement on dusky shark quotas, allocations, or fishing mortality levels. Therefore, this requirement is not applicable for these species.

5. *Review on a continuing basis, and revise as appropriate, the conservation and management measures included in the FMP*

NMFS continues to review the need for any revisions to the existing regulations for Atlantic HMS fisheries. Draft Amendment 5b to the 2006 Consolidated HMS FMP is the culmination of one of those reviews.

6. *Diligently pursue, through international entities, comparable international fishery management measures with respect to HMS*

NMFS continues to work with ICCAT and other international entities such as the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) to implement comparable international fishery management measures. To the extent that some of the management measures in this amendment are exportable, NMFS works to provide foreign nations with the techniques and scientific knowledge to implement similar management measures.

7. *Ensure that conservation and management measures under this subsection:*
   a. *Promote international conservation of the affected fishery;*
   b. *Take into consideration traditional fishing patterns of fishing vessels of the United States and the operating requirements of the fisheries;*
   c. *Are fair and equitable in allocating fishing privileges among United States fishermen and do not have economic allocation as the sole purpose; and*
   d. *Promote, to the extent practicable, implementation of scientific research programs that include the tagging and release of Atlantic HMS*

All of the objectives of the document indicate how NMFS promotes the international conservation of the affected fisheries in order to obtain optimum yield while maintaining traditional fisheries and fishing gear and minimizing economic impacts on U.S. fishermen. The preferred alternatives in this document are expected to meet these goals. More specifically:

a. As detailed in item 4 above, there is currently no international agreement on dusky shark quotas, allocations, or fishing mortality levels. NMFS will continue to work with the international community to promote conservation in fisheries that span international jurisdiction.

b. The preferred alternatives explicitly take traditional fishing patterns into account when establishing permitting, gear type, safe handling, and education measures. The preferred alternatives would reduce fishing mortality of dusky sharks while minimizing changes to fishermen's access to target species.

c. The preferred alternatives do not allocate or assign fishing privileges.

d. NMFS has a number of Atlantic HMS scientific research programs in place including tagging and release projects. The preferred alternatives would not directly implement or establish any new scientific programs, however, these actions would not impact existing programs either.

9.2 Paperwork Reduction Act

The shark endorsement considered in this action would become effective sometime after the effective date of the final rule. If the shark endorsement requirement is adopted, NMFS will submit a PRA change request to The Office of Management and Budget (OMB) to add this endorsement to the existing HMS permit PRA package (OMB control number 0648-0327).

Non-preferred alternative B10 would establish a dusky shark bycatch quota (IDQ) for the commercial pelagic and bottom longline fisheries. If this were to become a preferred alternative in the final rule, it would require a revision to the existing HMS electronic monitoring PRA package (OMB control number 0648-0372) as the alternative would require expanding electronic monitoring requirements to bottom longline vessels with shark directed and incidental permits, and would increase the number of bottom longline vessels required to have vessel monitoring systems (VMS). It would also add additional requirements for IDQ holders to report dusky shark interactions through their VMS units. A revised PRA package is not being submitted at this time as this is a non-preferred alternative.

9.3 Coastal Zone Management Act

The Coastal Zone Management Act (CZMA, 1972; reauthorized in 1996) requires that federal actions be consistent to the extent practicable, with the enforceable policies of all state coastal zone management programs. Pursuant to 15 CFR part 930.36 (e), NMFS provided one consistency determination that addresses the commonalities and differences of each state's enforceable policies. Pursuant to 15 CFR part 923 Subparts (B) through (F), NMFS reviewed the enforceable policies included in the CZMP relevant to this action of each state along the Atlantic coast, Gulf of Mexico, and the Caribbean Sea. NMFS finds the actions in Amendment 5b to be consistent with the following policies contained in each state's CZMP: uses subject to management, special management areas, boundaries, authorities and organizations, and public involvement and national interest. In addition, NMFS finds the alternatives analyzed in this action to be consistent to the maximum extent practicable with the enforceable policies to manage, preserve, and protect the coastal natural resources, including fish and wildlife, and to provide recreational opportunities through public access to waters off the coastal areas. Specifically, under these enforceable policies, this action is consistent in that marine resources will be managed and conserved by implementing Amendment 5b to the 2006 Consolidated HMS FMP. NMFS is seeking concurrence with respect to the preferred alternatives and will ask for states' agreement with this determination during the proposed rule stage. NMFS has worked closely with states in the past and would continue to work with the states to ensure consistency between state and federal regulations.

9.4 Environmental Justice

Executive Order 12898 requires agencies to identify and address disproportionately high and adverse environmental effects of its regulations on minority and low-income populations. To determine whether environmental justice concerns exist, the demographics of the affected area should be examined to ascertain whether minority populations and low-income populations are present. If so, a determination must be made as to whether implementation of the alternatives may cause disproportionately high and adverse human health or environmental effects on these populations.

Community profile information are available in the 2006 Consolidated HMS FMP (Chapter 9), a recent report by MRAG Americas, and Jepson (2008) titled "Updated Profiles for HMS Dependent Fishing Communities" (Appendix E of Amendment 2 to the 2006 Consolidated HMS FMP), and in the 2015 HMS SAFE Report. The MRAG report updated community profiles presented in the 2006 Consolidated HMS FMP, and provided new social impacts assessments for HMS fishing communities along the Atlantic and Gulf of Mexico coasts. The 2011 and 2012 SAFE Reports (NMFS 2011 and NMFS 2012) include updated census data for all coastal Atlantic states, and some selected communities that are known centers of HMS fishing, processing or dealer activity. Demographic data indicate that coastal counties with fishing communities are variable in terms of social indicators like income, employment, and race and ethnic composition.

The preferred alternatives were selected to minimize ecological and economic impacts and provide for the sustained participation of fishing communities. The preferred alternatives would not have any effects on human health nor are they expected to have any disproportionate social or economic effects on minority and low-income communities.

9.6 References

NMFS. 2006. Final Consolidated Atlantic Highly Migratory Species Fishery Management Plan. National Oceanic and Atmospheric Administration, National Marine Fisheries Service, Office of Sustainable Fisheries, Highly Migratory Species Management Division, 1315 East West Highway, Silver Spring, MD. Public Document. pp. 1600

NMFS. 2008. Final Amendment 2 to the Fishery Management Plan for Atlantic Tunas, Swordfish, and Sharks, and Highly Migratory. NOAA, National Marine Fisheries Service, Highly Migratory Species Management Division, Silver Spring, MD. Public Document.

NMFS. 2010. Amendment 3 to the Final Consolidated Atlantic Highly Migratory Species Fishery Management Plan. NOAA, NMFS, Highly Migratory Species Management Division, 1315 East West Highway, Silver Spring, MD 20910.

NMFS. 2011. Stock Assessment and Fishery Evaluation (SAFE) Report for Atlantic Highly Migratory Species, 2011. Silver Spring MD: U.S. Department of Commerce, National Marine Fisheries Service. 294 pp.

NMFS. 2012. Stock Assessment and Fishery Evaluation (SAFE) Report for Atlantic Highly Migratory Species, 2011. Silver Spring MD: U.S. Department of Commerce, National Marine Fisheries Service. 203 pp.

NMFS. 2015. Final Amendment 5a to the Fishery Management Plan for Atlantic Tunas, Swordfish, and Sharks, and Highly Migratory. NOAA, National Marine Fisheries Service, Highly Migratory Species Management Division, Silver Spring, MD. Public Document.

SEDAR, 2011. SEDAR 21 Stock Assessment Report: HMS Blacknose, Dusky, and Sandbar Sharks. SEDAR, 4055 Faber Place Drive, Suite 201, North Charleston, SC 29405. 415p.

10.0 List of Preparers

The development of this rulemaking involved input from many people within NMFS, NMFS contractors, and input from public, constituent groups, and the HMS Advisory Panel. Staff and contractors from the HMS Management Division, in alphabetical order, who worked on this document include:

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10.1 List of Agencies, Organizations, and Persons Consulted

Under 304(g)(1)(A) of the Magnuson-Stevens Act, NMFS is required to consult and consider the comments and views of affected Fishery Management Councils, ICCAT Commissioners and advisory groups, and advisory panels established under 302(g) regarding amendments to an Atlantic HMS FMP. NMFS provided documents and consulted with the Atlantic, Gulf, and Caribbean Fishery Management Councils, Gulf and Atlantic States Marine Fisheries Commissions, and the HMS Advisory Panel at various stages throughout the process. Hard copies and/or CDs of these documents were also provided to anyone who requested copies.

The development of this document also involved considerable input from other staff members and Offices throughout NOAA including, but not limited to:

- Other Divisions within the Office of Sustainable Fisheries (Alan Risenhoover, Emily Menashes, Galen Tromble);
- The Southeast Fisheries Science Center (Dr. Bonnie Ponwith, Dr. James Nance, Dr. John Carlson, Dr. Enric Cortés, Dr. Steve Turner, Kenneth Keene, Lawrence Beerkircher, Sascha Cuchner, Dr. Elizabeth Scott-Denton, Dr. William Driggers, and Dean Courtney);
- The Northeast Fisheries Science Center (Dr. Nancy Kohler, Dr. Cami McCandless, and Dr. Lisa Natanson);
- NOAA General Counsel (Caroline Park, Loren Remsberg, and Megan Walline); and,
- NMFS NEPA (Steve Leathery and Cristi Reid).

Comments on the proposed rule and the draft amendment/Environmental Impact Statement will be accepted for at least 60 days from the date of publication of the proposed rule in the Federal Register. An HMS Advisory Panel meeting and numerous public hearings will be held along the Atlantic Coast, including the Caribbean, and the Gulf of Mexico. Additionally, NMFS will request the opportunity to present the proposed rule and Draft Amendment 5b to the 2006 Consolidated HMS FMP to the five Atlantic and Gulf Regional Fishery Management Councils and two Interstate Marine Fisheries Commissions.

The Federal Register notice and the EIS, notice of upcoming hearings (with location, dates and times), and any necessary addenda will also be made available to the public via the HMS webpage.

11.0 Index